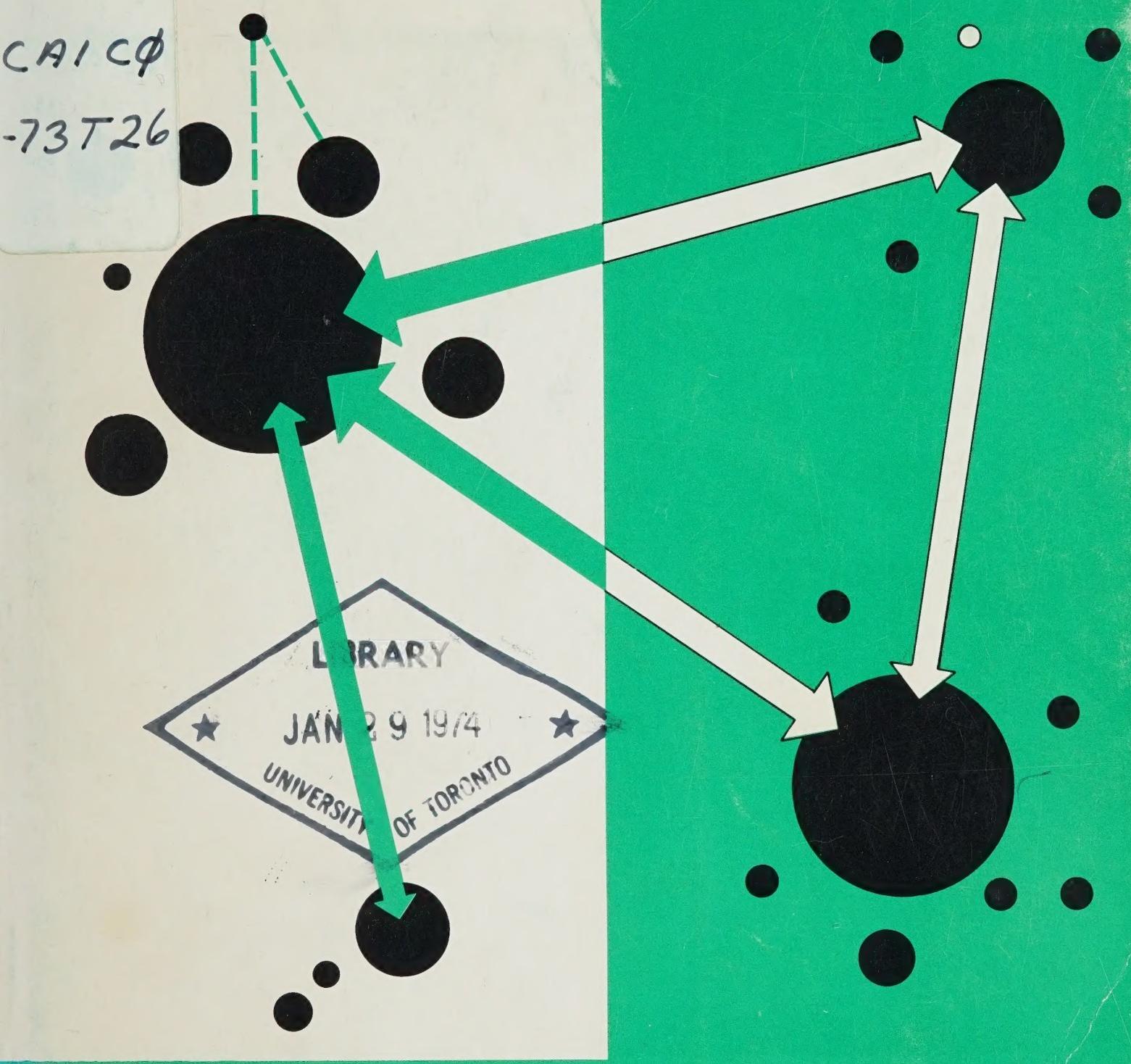


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TELECOMMUNICATIONS and the PLANNING of GREATER METROPOLITAN REGIONS

John Dakin

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**TELECOMMUNICATIONS AND THE
PLANNING OF
GREATER METROPOLITAN REGIONS**

A Study in the Symbiotic Development
of the Telecommunications and
Computer Technology and
Metropolitan Regional Environments

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University of Toronto Press
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This research is the development of further collaboration with Dr. J.B. de Mercado, Director-General of Educational Systems Planning in the Ministry of Communications, Canada. The collaboration began with the Wired City Seminar organized by the Ministry in June 1970, and was continued in the 1971-72 research recorded in *Telecommunications in the Urban and Regional Planning Process*. The research recorded here attempts to look at futures, relate the development of the telecommunications and computer technology to social change, and to propose specific experiments to be run on the Wired City facility being set up in Carleton University. The views expressed are not necessarily those of the Government of Canada.

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Toronto, March 1973

A.J. Dakin

INTRODUCTION AND SUMMARY

In previous research recorded in *Telecommunications in the Urban and Regional Planning Process* the cultural and social context in which the telecommunications and computer technology is to develop was identified as of prime importance.

Since the publication of that report the warnings of the Club of Rome and a group of British scientists (*A Blueprint for Survival*) have achieved a wide hearing. The threats of irreparable damage to the biosphere and realization of the impending shortages of energy and resources have moved the whole question of the patterns of human behaviour and settlement to a new level of urgency.

The hypothesis, or argument, of the research of which this document is the record suggests that there is now major evidence that our socio-economy will have to change radically in the next few decades since continuation of the present exponential growth rates in the use of resources cannot be maintained. It is therefore necessary to think about the shape of the future and derive directions in which we must move. Basic to any such enquiry is some overall view of what we think are the main areas of concern.

Search of the literature is capable of giving us some leads towards being able to generate a provisional worldview. From this worldview specifics of policies can be drawn, and scenarios of key areas of new institutions sketched out. Finally, suggestions for exercises attempting to work out aspects of the scenarios can be put forward for experimentation on the 5-node Wired City facility being set up by Dr. D.C. Coll and his colleagues in Carleton University.

The sequence of argument followed in the chapters of this report is:

1. Three areas of major concern for constructing a provisional worldview are identified: the area of ecology-resources which is of particular importance in view of the explosive growth of the world's population; the area of the socio-economies which must change in major ways if we are to respond to the ecology-resources threat and to the economic results of a runaway technology; the area of the self-actualization of the individual which will become a major cultural drive if thresholds of material wellbeing are ensured. The attempt is made to create a composite worldview incorporating these three issues.
2. From the literature of various disciplines and using the provisional worldview an attempt is made to identify the main directions in which major lines of regional policies should move. These are not goals because goals at present are scarcely capable of statement. Rather, we must seek out *directions along which we should push*. Among these is the very important notion of moving toward stabilization of population and 'capital' (total equipment) of the region.
3. From the directions it becomes clear that many of the institutions

to which we have been accustomed and which we use as categories of action are already in such states of change as to be in dissolution. It is therefore necessary to try to envisage new areas of foci of influence in society. This chapter attempts to develop the idea of societal organizational *nets* in which decision-making power will reside. It goes on to describe the telecommunications and computer networks necessary to assist the society to move in the directions of stabilization and decentralization (both physical and in decision-making).

4. This chapter sets out the details of exercises or simulations which would be useful as experiments for producing new knowledge and would be capable of being put into effect. An overall question we have to consider on the hypothesis of this research is: will the contribution of the telecommunications and computer technology be the main means of compensating for the changes in settlement patterns and socio-economic patterns so that levels of performance are maintained? The exercises are designed to yield practical knowledge for discovering how we must act. Chapter 5 offers further exercises.

The major conclusions of the study are as follows. They are not strictly in priority order, but are only approximately graded in importance.

1. *Decentralization.* Evidence accumulates that future growth of metros will increasingly involve diffusion of population through their greater regions. Telecommunications and computer technology will not only be used to make this possible but will play the key role in maintaining and enhancing the present level of transactions in metros and spreading that level across their regions. A more balanced symbiosis between urban and non-urban areas will be required.
2. *Cultural Shift.* Decentralization may partly be a physical manifestation of a decline in our ability to provide emotional support for the intensive application of the technological rationality on which our culture relies so heavily. This shift may tend to deprive upper levels of government of the power to act, particularly in large scale matters. By providing much higher levels of information the electronic technology could make good the loss of emotional support by reducing the demand on individuals without reduction in the level of performance of the socio-ecosystem. Through the application of this technology populations would need to devote less psychic energy to the maintenance of the apparatus of the culture.
3. *Planetary Awareness.* Because of a rising sensitivity to potential danger to the biosphere efforts will be made to control some of man's activities according to planetary criteria. Much greater attention is likely to be paid to the relation between man and nature. The electronic technology will be able to assist this emerging control by providing regional, national and planetary bio-information on a continuing basis. Special monitoring nets and networks will be required

for this. With rising populations the hope that world ecosystems will be able to support these populations will depend very heavily on the rapid societal development of the telecommunications and computer technology.

4. *Worldview*. It is necessary to develop a provisional worldview as a point of departure for thinking. The suggested worldview is a composite recognizing three key areas of human concern: the ecosystem, the psychosystem, and the socio-ecosystem. These represent the need for man to respect his physical environment, his interior life, and his activity in combination with his fellows. A new ethic has to be developed in terms of both ecosystem and socio-ecosystem. The region must be seen as simultaneously ecosystem, socio-ecosystem and psychosystem.
5. *Diversity*. There is need consciously to encourage diversity in ecosystems and socio-economic environments. The electronic technology will be required to play a reconciliatory role between diverse parts and the whole, as well as to open up new opportunities for diversity.
6. *Societal Decisions*. Increasingly decisions become broadly societal, whether under the present categories of government, industry, business, agriculture, etc. The diffusion of decisions will imply new roles for government which will be forced to rely increasingly on using the technology for achieving better public participation and linking the various levels of government. The technology offers the possibility of 'back to the marketplace' for public discussion. If developed, this will alter radically the processes of reaching *all* societal decisions.
7. *Socio-ecosystems* and the technology supporting them move blindly for the most part. Planned direction is a concomitant of very high grade technology. Our socio-ecosystems will move increasing toward being explicit in their purposes. Telecommunications will have the function of assisting this movement by making better quality information and new decision processes available. An implication is that the electronic technology itself should follow planned development supporting societal intentions. A Societal Decision Net should be developed.
8. *Information as Integrator*. The abundance society will rely on information as its integrating principle. This implies that there will be a shift from wealth conceived as material to wealth experienced as psychic growth. The present level of information is too primitive and networks have not reached an adequate level of integration for this role of the technology to be played effectively.
9. *Information Pollution*. As the electronic transfer of information becomes increasingly important it will be necessary to face problems of distortion and inadequacy.
10. *Dissolution of Institutions*. Government, education, family, work, the professions, etc. are no longer capable of very precise definition. Reformation of groups of functions is already going on in our society. If information is the new integration principle the new for-

mations will spring up around the uses of the information and the information networks. Thus what was 'education' integrated essentially by the written word becomes 'knowledge-nurture' integrated by the instantaneous access to knowledge and interaction with other individuals through the electronic technology.

11. *Stabilization.* Because of the major role played by certain natural resources in our socio-econsystems the threat of the running out of these resources will have to be taken seriously. An approach already being recommended is to abandon the present reliance on continuous economic expansion and to develop 'slower' economies. Any such stabilization will rely heavily in information for its success: inventories of materials being recycled, new outputs desired etc. Highly sophisticated information-handling will be required as communities move toward higher levels of conscious self-regulation.
12. *Energy.* A crisis in energy appears inevitable. A major consumer of energy is physical movement. Electronic technology is capable of substituting physical movement by information movement. This process of substitution should be developed as quickly and widely as possible to modify the rate of increase in the consumption of oil and gas. Similarly, the technology should be specifically applied to keeping down the energy costs of urban concentration by using telecommunications in preference to high densities.
13. *Self-Actualization.* Psychic wealth depends on the ability of individuals to realize their potential as human beings. In large measure this ability will depend on the ease with which the individual can access knowledge and can communicate (in the human sense) with others. Therefore the telecommunications and computer technology will be called upon to make easily available to everybody whatever knowledge they need and whatever opportunities for interaction are possible; this role is stimulation of the psycho-cultural development of man.
14. *Synergetic Brain Net.* Present communications between leading brains in a region or nation are inadequate for the rapid dissemination of new knowledge, particularly between disciplines. A result is that the synergetic benefits to the guiding of society are meagre. It is urgently necessary to place leading brains in a region in easy instantaneous interaction. In view of the major changes which must be faced in our socio-econsystems, networks should be set up to accommodate brain nets as soon as possible. Consideration should be given to extending the suggested Ontario universities' data network so that a beginning could be made on developing a Synergetic Brain Net.
15. *Knowledge.* Rapid improvement in knowledge dissemination together with much more orderly methods of handling by the individual will be required. The onus for this improvement will rest mostly on the electronic technology, which should now be much more vigorously used for this societal purpose. A Knowledge-Nurture Net should be developed as quickly as possible.

16. *Force Development of the Technology.* Because of the integrative role to be played by the telecommunications and computer technology governments at all levels should give consideration to forcing the pace of the development of the technology. The significance of Japan's approach (see Masuda) should be taken very seriously. Imaginative action in the next few years could bring Canada benefits of a magnitude wholly disproportionate to the effort made. Governments, in conjunction with other areas of decision-making (business, industry, brain nets, general public), will have to decide how much effort and in which directions to put it in moving into the information age. Priority suggestions, which now require further investigation are:
- (a) Development of the Synergetic Brain Net.
 - (b) Relating the Synergetic Brain Net to the Societal Decision Net.
 - (c) Development of the Societal Decision Net, which integrates decisions having to do with the ongoing processes of communities.
 - (d) Fostering of a new ethic which will relate to the concern for ecosystems, the reconstruction of the socio-ecosystem, and the stimulation of the growth of the psychosystem. The technology should be used to help develop this new ethic as quickly as possible.
 - (e) Use of the technology to promote the decentralization of large urban masses and the equalization of the advantages of the city across the whole greater metropolitan region.
 - (f) Systematic development of a 'third sector' in the socio-ecosystem, neither government nor private sector (Masuda).
 - (g) Systematic development of the technology for dealing with resources and energy questions.
17. *Symbiosis.* The electronic technology must not be regarded merely as servant to societal functions as at present defined and perceived. The technology will change those functions and generate new ones. Therefore the technology and its societal roles must be developed symbiotically and reciprocally.
18. *Needs.* Present 'needs' are not adequate guides on how to use the new technology. It is already generating its own 'needs'. Basically what is required are acts of imagination.
19. *Nets and Networks.* So far there is inadequate differentiation between the human relationships (nets) made possible by the technology and the technical equipment (networks) which creates the linkages. Both nets and networks require management. The types of management need study, particularly to ensure that creativity is not submerged in administration.
20. *Systems.* A theme constantly reiterated is the close interrelatedness of elements in our present and emerging culture. For this situation linear modes of thinking and planning are only marginally useful. Analysis, synthesis and the development and application of policies have to be systemic. The characteristics of the computer fit the complexity that this implies and the linking of sources

of information annihilates distance as an impediment to linking information from various sources. Thus the need for systemic thinking and acting interlock with the technology. The planning and development of the telecommunications and computer technology must also be systemic. For operational purposes the following information age key systems are identified: population, ecosystem, psychosystem, socio-ecosystem, spatosystem, technosystem, infosystem. Their interactions are very important.

21. *Experiments and Simulations.* Scientific control of the early experiments and simulations to be run on the Wired City facility presents the difficulty that the participants may be prevented from making free use of the equipment. It is therefore recommended that for the first experiments scientific control should be restricted to the technical and behavioural monitors. A pragmatic point of departure is preferred, using present personnel and situations.
22. *Teleconferencing.* In the proposed experiments teleconferencing emerges as a likely very important element in future planning, including the possibility of enlarging the scope of public participation, and reconciling some administrative conflicts.
23. *Handling Written Material.* A very important role of the exercises is to find out how to handle planning written material (e.g. compaction).
24. *Brain Power in Experiments.* The development of synergies could be a very important aid to developing the effectiveness of Canadian urban and regional planning.
25. *Electronic Space.* In the experiments it is the fact that the Wired City facility will provide a common electronic space, simulating common physical space, which is the seminal idea.

CHAPTER ONE

A TENTATIVE WORLDVIEW FOR PLANNING GREATER METROPOLITAN REGIONS IN THE INFORMATION AGE

1.1.1. Introduction

The question of modern man's worldview becomes increasingly important because of the pressure of numbers, the availability of certain resources or capacities (such as food production), and the possible threat to the planetary ecosystem. We are forcefully being confronted with issues which were hidden from earlier epochs.

The traditional worldview inherited by the modern West is a combination of the residues of Judaeo-Christian thought and feeling, Graeco-Roman culture, and the science-technology of the modern world. That we now have grave difficulties in regard to our worldview can scarcely be disputed. To be precise about the difficulties is another matter. The whole question remains largely speculative, when consciously examined, and any observations must be extremely tentative.

The general sense we have of the human situation is one of serious concern about our future. That the Judaeo-Christian and the Graeco-Roman worldviews, and nineteenth century science had no understanding of planetary ecology and the way the biosphere 'works' suggests that these worldviews will be seriously defective for modern conditions (1). *If so, it seems fair to conclude that there rests on us now the responsibility for reaching a worldview which is based on the best and most recent offerings of science.*

With all the risks of oversimplification it is useful to suggest:

Either, that the 'system' of our culture runs itself, is homeostatic in its processes, knows where it is going and we approve its direction. If we believe this we have the role of making the system more efficient.

Or, that the 'system' moves blindly, even dangerously without concern for human wellbeing or purpose. If we believe this we must believe in changing its direction toward ends we desire.

Which of these beliefs we hold will largely decide how we shall deal with the telecommunications technology. If we take the first view the technology will be allowed to develop in its own way, and our policies will do no more than facilitate any form of development which looks likely of success. If the latter, we shall favour so organizing the development and application of the technology that it will help us gain control of the socio-economy and guide its growth in desired directions.

The purpose of this chapter is to look at certain possible worldviews and to suggest a working composite from which key directions for the vitalizing of regional policies may be derived.

1.1.2. Planning Requires a Provisional Worldview Appropriate to Man's New Transition

In *Telecommunications in the Urban and Regional Planning Process* references are made to the general overall context in which planning takes place. Probing this area reveals that there are key linkages and dependencies between the overall context and our statements of goals and policies when attempting to guide the growth of metros and their regions. It therefore seems likely that if we do not examine sufficiently the question of overall context we shall run the risk of generating unsatisfactory goals, directions and policies. Further, clarification of context may improve the quality of the goals – or directions-finding processes.

What overall contexts are at present commonly used or assumed? This is a difficult question because often the statements in plans are not specific and frequently the most significant elements are assumed and implicit only. If we really wish to influence the course of events the effort must be made to be as explicit as possible about overall context. It is not abusing planning documents to charge that they have not generally based their goals statements on anything more than a hasty glance at the problem of defining or being specific about the overall context. Goals are frequently the work of committees of planners or laymen or both. The result is usually a series of obvious statements from which most items having any vitality have been banished.

It is important, therefore, that we should pay close and prolonged attention to the overall context; that we should look at various emphases and select from among them. Having arranged, examined, pondered and selected we should then *affirm*. The output of this process then becomes the source from which we can derive our goals or statements of direction. From these, in turn, we may formulate detailed planning prescriptions.

1.2. Various Overall Contexts for Planning

The following overall contexts are recognizable: economic, welfare, political decision-making, science-technology, psychic-cultural, ecology-resources. These represent worldviews or emphases of perspective; individuals see themselves and their world in these ways. Some have a model which relies heavily on science (e.g. scientific humanism – Julian Huxley); some see the world as exploitative opportunity or a utilitarian mechanism; others, like H.T. Odum, have reached a worldview which is a concept of existence as an ecological process with its own laws and generating its own ethic. In contrast with this latter view there are strong proponents of man as essentially self-actualizing in the sense of his striving to develop his inner potential.

Some of these contenders seem chiefly instrumental when examined closely. For example, political decisionmaking or political process, while capable of useful contributions in various areas of the planning process (e.g. direction-finding, goal-setting, implementation), is a way of arriving at something. Similarly, technology is fundamentally method or means and cannot reasonably be end. Science (not applied

science) is different because in pure form it does not seek to use or to act, but only to describe and know.

It seems useful, in spite of the monist emphasis of ecology, to separate for analytical purposes: nature as a dynamic and self-regulating process, and human cultures as dynamic processes. *This is not to deny that human cultures are part of 'nature'. It is, however, to suggest that the human part of nature has broken away from the controls developed over millenia by the ecological processes of interdependence and has become capable of destroying the natural dynamic basis of its own existence.*

1.3.1. Ecology as Major Context for GMR Planning

A key way of looking at the claims of the ecological approach to be a worldview is to say that inevitable population growth combined with undirected technological advance is already producing conditions which threaten our survival (2). Technological advance, among other effects, makes it possible for ever larger populations to be supported, at any rate for a limited time. Thus the likelihood of damaging the planetary life-support system is compounded.

The basic understanding is that the biosphere on which man is dependent for life relies for its life-sustaining capacity on conditions of 'balance' or 'steady state'. This balance may be at varying levels of productivity, the level deciding, in human terms, the extent to which human life may be supported. The concern expressed by ecologists is essentially that modern man is behaving in ways that damage the local and world ecosystems; and that unless major changes of behaviour are made soon serious degradation is inevitable. A simple diagram of an ecosystem is shown in Fig. 1A.

The element through which modern man introduces gross disturbance into ecosystems is science and technology. Particularly important is the impact of the technologies which have brought energy into the contemporary biosphere in massive quantities. The large injections of energy which we apply must of necessity have heavy impacts on the ecosystems. For example, more energy means more people, higher levels of energy consumption; this means more food required, involving major changes in vegetation (e.g. from forest to ploughland).

The impacts that we have made, and will make for some time to come on ecosystems, are all the heavier because of our ability to call on the stored products of earlier ecosystems – the fossil fuels of coal, natural gas, and oil. Through these we are able to escape, for a time, the controls inherent in an ecosystem dependent only on contemporary photosynthesis. Thus we may irreversibly damage considerable areas of the biosphere.

In the past cities and empires decayed and disappeared because their ecosystems were changed beyond the point where they could recover the necessary level of balance to sustain themselves. For example, the Roman city of Timgad in North Africa disappeared as its once fertile umland degenerated into desert through too extensive interference with the ecosystem.

We now understand how our world works as a system of interactions between the various elements of the biosphere and the biosphere of previous ages (non-renewable resources). Ecologists emphasize the unity of the system and that man, his civilizations and technologies, are integral parts of the system.

1.3.2. Application of the Findings of Ecology

In the last few years notable individuals and groups have applied these concepts to man's present condition and direction of likely development during the rest of this century. Some have warned of imminent danger. Among them we may cite the writings of certain British scientists brought together in *A Blueprint for Survival* as strongly expressive of this opinion (3). This book tackles the question under these headings:

The Need for Change. The industrial expansionist way of life is not capable of being sustained in the foreseeable future (say, one lifetime from now). Radical change is inevitable. The 'ecological demand' (summation of all man's demands) is doubling every 13.5 years; this means a multiplication factor of 6 by 2000 AD). The exponential character of the consumption curves is extremely dangerous. The *disruption of ecosystems* through loss of stability, diversity and complexity is a very important reason for planning conscious change. *Failure of food supplies* is a high probability as ecosystems cannot be pushed beyond a certain point in providing food. At the present rates of growth of consumption all but a few of the metals resources will be exhausted. This *exhaustion of resources* includes problems connected with energy. The *collapse of society* is predictable as our present socio-economy based on ever expanding industry diminishes in viability. Massive unemployment or underemployment is likely. In conditions of this kind the recklessness of governments will be a dangerous element in the social chaos. Our attempts to apply remedies must be based not on political interests but on an understanding of our ecological situation and our social condition. Collapse of both ecological and social systems is threatened. Unfortunately there is no certainty that technology will be applied in remedial ways. Our aim must be to reach a sustainable type of society with maximum human satisfaction obtainable within the limits of stability.

The Strategy for Change toward the *Stable Society* is: (a) minimum disruption of ecological processes; (b) maximum conservation of materials and energy ('stock' rather than 'flow'); (c) stable population; (d) social system offering enjoyment rather than restriction to the individual in terms of the first three items (4). These are descriptive of conditions to be aimed for. They are to be achieved by 7 prescriptions: (1) control environmental disruption by technical means; (2) halt present trends; (3) reduction of the most dangerous components by using technological substitutes which will be less damaging for short-term; (4) replacement of those technologi-

cal substitutes by 'natural' ones; (5) alternative technologies conserving energy and materials; (6) general decentralization of government and economy, with communities small enough to be 'reasonably' self-regulating and self-supporting; (7) education for such communities.

Minimizing the Disruption of Ecological Processes. Dispersal of pollution is not a cure. Control depends on recovery and recycling. The aim must be to return to the 'natural' processes of the ecosystem. Pollution includes the use of pesticides and fertilizers, domestic sewage, industrial wastes. Most important, therefore, is *Conversion to an Economy of Stock*. This means resource management which includes a raw materials tax, an amortization tax (inverse ratio to the life of the object), closed circuit systems for water, a power tax, substitution of materials, greater use of renewable resources including preservation of wilderness areas, social accounting exposing social costs, revising our ideas about the GNP; generally the uniting of ecology and economics.

Stabilizing the Population. Apart from the question of food consumption population numbers are related to emotional and social levels of wellbeing. The general idea in regard to food is that population should not exceed the carrying capacity of a country (or other areal unit). The carrying capacity can be more or less calculated since little further significant increase in yield can be expected (5). The study, therefore, concludes that Britain should reduce its population to 30 million, or less, and stabilize. Some countries could stabilize near present population levels. Governments will need to apply specific population policies. These are listed in outline.

Creating a New Social System. The most radical notion here is decentralization, justified because: (1) since great restraint by individuals will be necessary there must be full community participation in the decision-making. The larger the community the less workable this is; in a heavily centralized situation the restraints would largely be coercion, not free decision by individuals; (2) agriculture must become more diversified; this will produce a more diversified urban-rural mix; this in turn will reduce movement costs; (3) the key idea is that only in a small community can the human being be truly an individual (is this so?). In large urban areas man is only an 'isolate'. Hopefully small communities will have less obsessive ideas about the possession of goods; (4) the arrangement of population in small communities reduces the impact of settlements on the environment. Costs are reduced. Neighbourhoods of 500, communities of 5,000 and regions of 500,000 are suggested as units of representation. This implies the decentralization of industry. Likewise as many functions of centralized government as possible should be transferred down the line.

The Orchestration (or planning) of these changes is laid down in 26 items and a chart of dates of application is included:

- (a) establishment of national population service;
- (b) introduction of raw materials, amortization and power taxes; anti-disamenity legislation; air, land and water quality targets; recycling grants; revised social accounting systems;
- (c) developed countries end commitment to persistent pesticides and subsidize similar move by undeveloped countries;
- (d) end of subsidies on inorganic fertilizers;
- (e) grants for use of organics and introduction of diversity;
- (f) emergency food programme for undeveloped countries;
- (g) progressive substitution of non-persistent for persistent pesticides;
- (h) integrated control research programme;
- (i) integrated control training programme;
- (j) substitution of integrated control for chemical control;
- (k) progressive introduction of diversified farming practices;
- (l) end of road building;
- (m) clearance of derelict land and beginning of renewal programme;
- (n) restrictions on private transport and subsidies for public transport;
- (o) development of rapid mass-transit;
- (p) research into materials substitution;
- (q) development of alternative technologies;
- (r) decentralization of industry: part one (redirection);
- (s) decentralization of industry: part two (development of community types);
- (t) redistribution of government;
- (u) education research;
- (v) teacher training;
- (w) experimental community;
- (y) domestic sewage to land;
- (z) target date for basic establishment of network of self-sufficient, self-regulating communities.” (6)

1.3.3. Emergence of an Ethic Based on Ecology

Bates deplores the way we have organized our knowledge into various bodies: social sciences, biological sciences, humanities, etc. Control depends on understanding the processes, but no single area of thought will guarantee this understanding (7). Like others, he repeatedly stresses the need to develop diversity. *The whole question eventually he sees, in common with many others, as ethical; we need to develop an ecological conscience.* The underlying dynamic of such approaches is that knowledge demands responsibility. The focus of the knowledge is that trends in human societies drive now strongly toward the *simplification* of natural communities (e.g. land cleared for agro-industry) in face of the fact that stability is dependent on *diversity*. Yet increasing human numbers press toward simplification, whether of food-growing or government. *Conserving and developing the diversity of nature Bates sees as the moral way forward.*

1.3.4. Comment on the Ecological Ethic

The question whether a new ethic which would guide human action can be based on the findings of ecology is difficult to clarify, let alone answer. At present it probably cannot be answered, but some comments on the difficulties may be made:

1. Some opinion thinks the predictions for the running out of essential resources are more pessimistic than is warranted by the evidence.
2. Some opinion thinks that although man is undoubtedly causing local deterioration in the planetary ecosystem, that system is so large that these effects will not diminish its overall stability (8).
3. The ethic would essentially be based on the fear and threat of disaster in the relatively near future; we would be persuaded to behave 'properly' in order to stave off doomsday.
4. Ordinary citizens could be coerced into behaving ecologically-ethically by sanctions of law, public administration and the market. It is not easy, however, to see what will persuade governments, already tardy in their responses, to embrace an ecologically-based ethic and act upon it.
5. The appeal of the ethic is inevitably to individuals to restrain themselves *now* largely for the benefit of some other individuals in the future. Is not this a weak appeal?
6. The discipline of the ethic must be mainly external to the individual and authoritarian in our present circumstances.
7. The implications of the ethic are nothing less than a complete reconstruction of our society, as is made quite clear in *A Blueprint for Survival*.
8. More optimistic voices urge that technology is capable of counteracting many of the threats to survival if applied intelligently. This might well mean an acceleration in the use of telecommunications and computer technology.
9. It seems likely that the present socio-economy must undergo major changes soon; that in its present form it is directionless and out of control.

These comments, taken together, seem sufficient to raise doubts of whether an ethic based on the ecological view of the world can stand by itself as a workable provisional worldview or context for planning.

1.4.1. Drive Toward Self-Actualization as Worldview

In spite of the monist emphasis of the ecologists – the argument that ecology can be all-embracing – there is the difficulty that the laws which govern ecosystems do not govern man's interior life. We see 'outer' reality differently from 'inner' reality. Ecology, an 'objective' science, gives some account of how the biosystem of the world 'works'. Like other sciences it is impersonal. Its appeal must be through reason.

Man, however, has other knowledge. Some scientists now think a *personal* science must be developed in a way complementary to our present *impersonal* science to deal with this knowledge which is not very well amenable to the scientific techniques we have already developed.

Abraham H. Maslow, for example, makes this plea in *Toward a Psychology of Being* (9).

Such an idea is of far more than passing interest in view of the following linkages of argument. There is substantial support for the idea that human values are satisfied in a hierarchical order (e.g. I.A. Richards, R.B. Perry, A.H. Maslow). This means that once a need is satisfied the psyche moves upwards on a scale of drives. There is, so to speak, always a latent psychic drive present which builds on the needs already secured (Fig. 1C). This idea has been refined by some psychologists who use the phrase 'self-actualizers' or 'self-realizers' to denote a certain quality and level in the upward drive characteristic of individuals who continuously move in the direction of realizing their potential as human beings. Maslow describes this as a 'pressure toward unity of personality'. He arrives at his conclusion empirically by examining specific individuals (10).

1.4.2. Material Abundance in the Psycho-Zoic Phase

The importance of this line of exploration for our present thinking is apparent when we put it in the context of our capacity to produce goods and services in abundance. If large populations of mankind are capable of being sustained by an assured level of material wellbeing their psychic drive will move them onward up the hierarchy of needs (or values). Their attention will be removed from preoccupation with the mechanics of finding sustenance and will be focused on other 'needs'. In short, their tendency to self-actualize will be encouraged. This description could now fit large numbers of individuals in North America, Europe and perhaps the USSR. Given modifications of the socio-economy it could include millions more.

Maslow gives the characteristics of the self-actualizing individual as:

- “1. Clearer, more efficient perception of reality.
- 2. More openness to experience.
- 3. Increased integration, wholeness, and unity of the person.
- 4. Increased spontaneity, expressiveness; full functioning; aliveness.
- 5. A real self; a firm identity; autonomy, uniqueness.
- 6. Increased objectivity, detachment, transcendence of self.
- 7. Recovery of creativeness.
- 8. Ability to fuse concreteness and abstractness.
- 9. Democratic character structure.
- 10. Ability to love, etc.” (11)

1.4.3. Present Drive Toward Self-Actualization

Evidence of change is already discernible in the young. They frequently insist that they are not willing to take a job for the sake only of getting the money to satisfy basic necessities. Typically, they demand 'meaningful' jobs, indicating that they are giving a very high place in their values to the realization of their own potentials. *This perhaps really means that they stand at a place in the hierarchy of needs or values, where a new cultural development of great importance is emerging.*

If this is so, we have, or imminently shall have, millions of individuals who will *immediately understand* the psychic significance of the situation. They will therefore be approachable by appeal to their desire for self-realization without any exhortations, coercion or complex explanations of why they should do this and not that. This means, presumably, that the basis of a new ethic might be discoverable, or that an ethic could at least be attached, with immediate expectation of being understood, to the vision that self-actualization is possible.

1.4.4. Ethic of Self-Actualization

The chief characteristic of an ethical viewpoint based on self-actualization would presumably be that it would be interior to the individual in its application rather than external and authoritarian. Again, as in the case of the self-actualizing personality, we have evidence of a preference for discipline and guides to behaviour to be applied interiorally rather than from outside. Some educational policies are based on promoting this idea (12).

The interior dependency of such an ethic would appear to be in line with the contemporary spirit. In contrast to it the authoritarian commandments for an ecological ethic enunciated by H. T. Odum belong to the industrial era (13). The fact the Odum feels the new ethic can be generated and supported by a new ten commandments is itself depressing, and if the conclusions suggested about self-actualization and interior discipline are correct in our time, tends to suggest that the ecological point of view, although in a leading position scientifically, in human cultural terms is still relying on cultural assumptions that many of the young, at any rate, may have already abandoned.

Although depending on interior enforcement an ethic based on self-actualization would need to be broad enough to ensure that an adequate set of attitudes toward the biosphere will be developed. Having reached his present level of understanding of, and mastery over the outer world man must not lose it as Western Europe lost it when the Roman Empire decayed.

1.5.1. The Changing Socio-Economy as Key Context

Regarding the socio-economy as the chief area of context for planning greater metropolitan means giving first place not to man as an element of the biosphere (the ecological approach) or to man as an evolving psychic individual (the self-actualization approach) but to the perspective of man in his group aspects.

From the literature we may extract some broad ideas offered by individuals or groups:

1. The new technology has already subjected the socio-economy to major impacts. Automation in both blue and white collar employment, the development of the mass media (electronic), and the much improved capacity to handle information are very clearly identifiable.
2. As one result of these impacts the relationship production – job – money – consumption has changed and will continue to change.

Production needs a diminishing labour force for an increasing output. The assumed unbreakable connection between job and power to consume is breaking down, and is seen increasingly as a condition belonging to the decaying industrial civilization.

3. The acceptance of the possibility of genuine abundance of material things is producing new cultural opportunities whose outlines are just beginning to be discerned. Even new possibilities for personality bases of civilization are being seriously thought about, and for the first time millions of human individuals imaginatively move toward a society in which the accustomed limitations of poverty, scarcity and excessive toil are removed.

So great is the disruptive power of these elements that many writers consider that the changes now happening in the socio-economy indicate one of man's two or three greatest upheavals. Kenneth Boulding, for example, rates the present as man's second great transition (14). The first was when man moved from precivilized to civilized society 5,000 to 10,000 years ago. The second is the present transition from civilized to 'postcivilized' society.

It is to be noted that while these insights are related to our other two approaches (the ecological and self-actualization contexts) they concern essentially a kind of 'third sphere' of human existence, generally referred to as human cultures. In early cultures man had very low ability to affect the ecosystem on the one hand and the psychosystem of his interior life on the other. He had little understanding of either system. What we call civilization has been characterized by a growth in understanding of both systems and man has learned to create this third element – the socio-economy of modern cultures. This third system is now of major proportions. We must look closely at key aspects.

1.5.2. No Overall Societal Control of Technology

The literature strongly suggests that the prime cause of the present rapid change in the socio-economy is attributable to the explosion in scientific knowledge and technology. Perhaps not enough attention is paid to associated factors such as the growth of population, the stimulus of wars and the philosophies under which socio-economies have been run during the last few centuries.

This last element, the philosophies, is the substance of our present concern. It would seem safe to say that the liberal laissez-faire attitudes of the last two centuries have very seriously underplayed the importance of the effects of our technology-based economy on the biosphere. This is now being stressed by the ecologists.

The emergence of questions about the nature, safety and purpose of technology is important. Thinkers like Jacques Ellul and Lewis Mumford made penetrations into this area over thirty years ago. Warnings of danger to the socio-economy through undirected and runaway technology are not uncommon and join with ecology on the one hand and the literature on human behaviour on the other to suggest that the socio-economy must be put in better shape if it is not to destroy the biosphere which is its host, or to destroy man's inner life through

anomie, or entropy due to boredom and psychic decline, as Boulding suggests.

Therefore, we may say that not only is a new technology emerging but also a new view of what technology is and what its role should be. In other words, out of the technological impacts there are appearing new values about technology itself. Robert Heilbroner has stressed this (15). This is a very interesting cybernetic-type of process. Can man generate a socio-economy with a built-in control? The key to any such control would very likely be high quality continuous information about the technology and the socio-economy of which it is the base.

There is, as yet, not much evidence of thinking along the line of the profile of a socio-economy in which technology is not left largely to the vagaries of the market. At present, in the West, a technological offering is applied in practice largely on the fortuitous conditions of patents, marketability, existing market 'empires' etc. The market, however, as John K. Galbraith stresses, has probably ceased to be the dominant element in our socio-economy (16).

1.5.3. Degradation of the Production – Job – Money – Consumption Linkage

The second major area, the production – job – money – consumption linkage, is already showing some interesting changes from the typical patterns of the industrial area. The problem of unemployment or underemployment (meaning some individuals in the society have not adequate access to the goods and services produced) harasses all contemporary governments, with its inseparable ghost, steady inflation, hovering over it with sinister import. What stability the old industrial socio-economies had may have been largely dependent on the fortuitously large role played by the component labour in the production process. *As an extreme abstract scenario we are now able to visualize that automated processes can produce goods without human assistance, hence cutting the worker off from access to the goods produced.*

Attempts to modify the inherited socio-economy to meet the new situation are appearing: the guaranteed income, generous welfare payments, expansion of unemployment insurance, government creation of jobs, support for initiatives generated by members of the public, keeping the young in dependence longer through educational grants, and earlier retirement. At present in Canada particularly, but also in other countries, these measures are not enough to keep the 'unemployment' below an 'acceptable' level and all countries juggle unemployment and inflation. New measures will be required even to the extent of virtually rethinking the whole socio-economy – a task at which a considerable number of thinkers in many disciplines no longer boggle.

Notable in the field on the distribution side is Robert Theobald. Early in the sixties he was writing about the implications of abundance (as opposed to the present excessive but not usefully directed production). He has also been an advocate of a twofold approach to the problem of the progressive failure of our wealth-distribution methods: Basic Economic Security and Committed Spending. He suggested in 1966 a

BES of \$1,300 per adult and \$800 per child, and thought this within the capacity of the US (17). The BES would put a floor under those in the lower income brackets. Not only jobs requiring lower level skills will become fewer in number as market-supported opportunity, but also managerial and middle range jobs will be insufficient in number. For individuals in these occupations sudden drops in income and inability to meet commitments will occur. Support would have to be given in these cases in the form of allowances under a Committed Spending scheme.

1.5.4. Information is the New Integrating Principle for Regions

Although the question of change in the means by which our goods and services are distributed is singled out as of exceptional importance by Theobald and others, and this importance is underlined by the existence of continuous study of this problem (e.g. current experiments with guaranteed incomes in Ontario and other provinces of Canada), *the message of the literature is that we must be concerned with the socio-economy in all its aspects rather than attempt isolated injections of change*. In accordance with this necessity (the systemic approach) Theobald goes on to mention that our urban planning efforts have been based on the notion that production (industrial style) and transportation are what the city is chiefly about. In the present reality he asserts, like R.L. Meier, Marshall McLuhan and others, that this is not so, but that it is communication which is now the great integrating principle (Fig. 1B). *How do we accelerate the input of information and new ideas into the urban system? How can a new vision of the city be generated and communicated? This leads directly to the question: How can we use the telecommunications and computer technology to turn the city on?*

Theobald then goes on to describe a city communication model which would use the media for individuals ‘... deeply concerned about the place where they live ...’, ‘... who hold strong views about the steps which can be taken to improve the city ...’

1.5.5. Linear Organization No Longer Suitable

Theobald has something very relevant to say about the organization of the socio-economy. He condemns linear organizations as now too susceptible to over- and underload (18). They also extend existing patterns rather than generate new ones. Further, they are unreliable in their handling of the key commodity – information. To these questions he links structural and sapiential types of authority to suggest our need to develop the latter if our socio-economy is to be rescued from the inhibitions of the industrial era.

A hopeful sign in urban planning that these ideas may be capable of assimilation is to be found in the emergence of systemic planning as an approach to the process of guiding cities and regions. Unfortunately, so far, neither by education nor practice, have planners often been able to free themselves from linear modes of thought.

1.5.6. Abundance Rather than Excess

We must now look briefly at the potential of abundance. Science and technology have opened a cornucopia of physical goods. In spite of the fact that much present production is dependent on non-renewable resources which will be in short supply in the foreseeable future (e.g. oil) there may be enough knowledge available to develop viable alternative sources for the manufacture of goods. Most interesting is man's already highly developed capacity to create new substances (e.g. plastics). The possibility of abundance, meaning an at least 'adequate' supply of produced goods, is accepted by many writers, and the exponential growth of technology may be able to increase the output relative to populations.

Most worthy of debate are the methods by which we 'decide' to produce and select the materials of production. That the present process is blind has been pointed out by many observers from Mumford and Ellul onwards. *What they mean is that we produce not according to any reasoned policy based on need, or social justice, or coherent use of resources, or economy, but on the basis of a complex network of conditions which in aggregate are devoid of human purpose.* The tune is called by the 'system'. We make things for no other reason than that we are able to make them and can fit their disposal into the market. Adam Smith's hidden hand is there alright but few are now convinced that it has, or ever has had, any idea what it is doing.

1.5.7. Production Based on Waste

This socially purposeless application of technology to production manifests itself in waste. Production becomes excessive in quantity, delivers the 'wrong' goods, debauches quality, and actually builds in waste in order to maintain the production process for no other purpose than self-perpetuation. Production becomes an end in itself, paying no attention to its role in society, its depletion of resources or its damage to the ecosystem.

Theobald has stressed the difference between the present excess in production and the idea of abundance (19). His view, and that of others, is that controlled abundance is a realistic expectation if we can move the socio-economy away from its contemporary excesses and aimless 'development'.

The key idea for such a shift must be some social planning of production. Galbraith points out that industry is increasingly forced to plan by the nature of technology (20). It plans, however, within its own narrow parameters and is largely able to ignore assessment of its behaviour in terms of the society's welfare.

What comes clearly through is the insight that abundance may be possible if we find ways of reconstructing the socio-economy so that its processes support human purposes instead of dragging society round in a directionless merry-go-round. Some approaches, however, may be criticized as too idealistic, particularly in their failure to penetrate sufficiently into the true nature of our present process of production.

1.6.1. Worldview Based on Ecology, Self-Actualization and Socio-Economy

We have looked at three overall contexts or components of a worldview – the ecology-resources perspective, the self-actualization aspiration, and the condition of the socio-economy. We have seen that although the ecology view includes man in the concept of the ecosystem in practical terms an ethic developed from this concept will appear external to the individual, an imposed and authoritarian view with sanctions derived from outside the individual (the threat of damage to future generations). At the other extreme we have identified a growing awareness of man's capacity to experience himself as an evolving entity, as an individual aspiring to develop his own potential. And this we saw is conducive to an ethic with interior sanctions; the individual will be hesitant to act in ways which will diminish his movement toward self-actualization. Third, we have suggested that human cultures are now so highly developed in both the above aspects (mastery of the external world and accumulation of inner capacities) that our socio-economies can claim to be a 'third sphere', man being able to combine the outer and the inner with firm certainty in his cultures.

1.6.2. No Single Base for Worldview or Planning Context

There seems no case for selecting any one of these three as the sole basis for a worldview. This is to say that the ecology-resources view, however urgent the problems it uncovers, cannot alone stand as a worldview as some ecologists, e.g. H.T. Odum, appear to claim. The weakness of the view is that although man can be readily admitted as part of the ecosystem and a monist view embraced, there is doubt whether the view can be internalized as the laws of the psyche seem radically different from those of the ecosystem (compare Figs. 1A and 1C).

Similarly man cannot exist as a creature wholly oriented in an interior direction. He does, however, have to have a worldview which gives adequate place to the fact that man knows himself from within and not only as an external or 'scientific' description of himself. He knows what it is to grow interiorally and has a drive to seek this kind of growth. A worldview, or context for planning, must therefore acknowledge man's interior preoccupation as much as his physical survival.

1.6.3. The 'Third Sphere' (Socio-Economy) Depends on the Other Two

As an observed fact man has succeeded in combining his external condition and some aspects of his internal condition to form human cultures which for convenience we refer to as the socio-economy. Obviously man may take a worldview grounded chiefly in his interest in his own created 'third sphere'. If he does this exclusively, however, the risk is run that the socio-economy may develop and act in ways that cannot indefinitely be supported by the physical system in which he lives. Or, on the other hand, a danger, expressed by Boulding, Dubos and others, appears if man adapts too well to his socio-economy and neglects his interior growth in that the quality of the human psyche deteriorates.

1.6.4. Present Thrust in the Three Areas of Worldview

In spite of the danger of objections that the conceptualization risks losing some benefits of a holistic approach it seems useful to acknowledge the three as the *joint* ground of a worldview (Fig. 1D). If we do so, it is encouraging to observe that in all three there are at the moment signs of very strong aspiration towards greater awareness. The ecologists are vigorously drawing our attention to the need to take very seriously the effects of exploding populations and our present socio-economies on the biosphere. Unless our socio-economies change disaster is threatened not only to the socio-economies but also to the race. In matters of the growth of man's psychic wealth both individual thinkers and mass attitudes are vigorous in the development of new aspirations, eager to take advantage of improvements in the level of wellbeing provided by the socio-economies. In the socio-economies there are both push and pull forces making for the emergence of new forms of socio-economy which will pay appropriate attention to relationships in the ecosystems and to the inner aspirations of human beings.

1.6.5. Key Role of Telecommunications and Computer Technology

Information and communication stand out as the probable key integrating element between the three components of the worldview (Fig. 1E). Without a very high level of integration the necessary levels of interaction between the three will be impossible. The electronic technology offers the hope of reaching such high levels. In addition, however, to the function of integrating, the technology offers very extensive possibilities for the 'internal' development of each component. Thus, through the technology, the socio-economy can achieve a very high level of efficiency for serving man's life purposes, and the individual will find the means for reaching his full personal potential.

1.7. Conclusion

The offering of this chapter is that there is enough evidence of vigorous activity in human societies capable of being conceptualized under the three headings of: ecology-resources, self-actualization, and socio-economy. A synthesis of these could produce a worldview with a new ethic. In the next chapter we shall try to deduce key leads derived from this worldview for guiding the life of greater metropolitan regions. As information and communication seem the likely organizing principle we shall suggest for each lead some significances of the telecommunications and computer technology. This technology will play a major role in the essential task of redirecting socio-economies toward consciously defined human ends.

- (1) Progressive coercion and oppression was required to hold the Roman empire together as the energy flow diminished.
- (2) Whittaker, *Communities and Ecosystems*, 149–151.
- (3) The Ecologist, *A Blueprint for Survival*. Equally important is the work of the Club of Rome, for example: Meadows et al., *The Limits to Growth*.
- (4) Meadows et al., in *The Limits to Growth* give the following basic technological discoveries which would help the steady state society: new methods of waste handling including recycling, better recycling techniques, increase the life of manufactured products to minimize capital depreciation rate, use of solar energy, natural pest control, improved medicine to reduce the death rate, improved contraception methods to equalize birth and death rates, 182.
- (5) Nevertheless the ‘green revolution’ which has improved yields by making it possible to increase the input of nitrogenous materials can increase some yields 2 or 3 times. See Ward and Dubos, *Only One Earth*, 221 et seq.
- (6) From The Ecologist, *A Blueprint for Survival*, 58–61. See also Ward and Dubos, *ibid*, “Strategies for Survival”; Boulding, *The Meaning of the Twentieth Century*, 180–199, and Roszak, *Where the Wasteland Ends*, 432.
- (7) Bates, *The Forest and The Sea*.
- (8) Maddox, *The Doomsday Syndrome*, Chapter 5.
- (9) Maslow, *Toward a Psychology of Being*, 215–219. He gives as man’s basic needs: psychological, safety and security, social, ego, self-fulfillment.
- (10) Maslow, *Motivation and Personality*.
- (11) Maslow, *Toward a Psychology of Being*, 157.
- (12) Government of Ontario, *Living and Learning*.
- (13) H.T. Odum, *Environment, Power and Society*, 244.
- (14) Boulding, *The Meaning of the Twentieth Century*.
- (15) Heilbroner, “Do Machines Make History?”
- (16) Galbraith, *The New Industrial State*, 120 et seq.
- (17) Theobald, *An Alternative Future for America*, 92.
- (18) Theobald, *Habit and Habitat*, 41 et seq.
- (19) Theobald, *Ibid*, 155.
- (20) Galbraith, *The New Industrial State*, 34 et seq.

Note: Full details of the references for all chapters are to be found in the bibliography.

CHAPTER TWO

THE ROLE OF TELECOMMUNICATIONS IN KEY POLICIES FOR PLANNING GREATER METROPOLITAN REGIONS

2.1.1. Chain of Reasoning

In the first chapter it was shown that there is rising concern for: man's behaviour in the biosphere, his interior individual life, and his group life. We also saw that our understanding of the systemic inter-relatedness of these spheres makes it dangerous to act in one without understanding the significance of so acting in the other two. Our appreciation of the systemic relatedness is as important as our awareness of our condition.

This insight suggested the need for setting up a tentative worldview that could serve as the basic rationale for action. We concluded, after review, that a composite would be most appropriate; that a worldview based solely on the knowledge of ecology or the insights of those whose concern is for the inner life of man, or the reforms advocated for man's collective life in the socio-economy, would not alone be adequate and could well be dangerous. We must, therefore, be aware of the need for appropriate action in all three spheres and must constantly watch inter-relations.

Our tentative worldview requires us to act so that man's biological context is safeguarded, so that his capacity for self-actualization is given the fullest opportunity, and so that the socio-economy is reorganized in accordance with the requirements of the other two spheres and can give full support to human life on a stable continuing basis.

From this point we may extract from the literature the more important strategies proposed for handling the human situation. Then from our worldview and these strategies we may compose a list of key guides for the development of policies for greater metropolitan regions.

These key guides may then be looked at for their regional effects, and from this we may look at the potentials of the telecommunications and computer technology for each guide.

2.1.2. Concept of GMR

A note is necessary on the concept of the greater metropolitan region. Some preliminary ideas on this idea appeared in *Telecommunications in the Urban and Regional Planning Process*. Tentatively, the region might be regarded as about 400 miles (640 km.) diameter. This figure arises from a combination of telecommunications and transportation considerations. *The GMR should not be visualized as the city-centred region or as a region necessarily dominated by a major metropolitan area other than as an anachronism. The region should be seen as a network of telecommunications and physical communications with*

many foci of concentration of certain human activities (at present not specified). The nearest analogy is perhaps Lewis Mumford's concept of 'a regional framework capable of embracing cities of many sizes' – he goes on to say that the concept has still to be worked out (1).

As we list our key guides some further ideas on the nature of the GMR will appear. The great conceptual difficulty is that of shifting our view of the current integrating principle from the physical spatial characteristics of the location of manufacturing industry and its transportation facilities – the very essence of the industrial era – to the non-physical, non-spatial telecommunications of the 'post-civilizational' age of information.

2.2.1. Strategies for Regional Action

Contemporary strategies for organizing the behaviour patterns of man and the physical patterns of the equipment of the socio-economy can be grouped:

- (1) Those based chiefly on concern for the survival of man in the biosphere.

These are usually produced by scientists competent in the life sciences whose knowledge leads them to conclude that major changes must be made in man's bio-behaviour (2).

- (2) Those based chiefly on concern for restructuring the socio-economy so as to be more appropriate for satisfying human needs.

These are put forward by often less conventional social scientists who regard the present socio-economic system as in a state of decay and in need of reconstruction.

- (3) Those based on the desire to make the present socio-economy 'work' more efficiently.

Strategies in this category are largely built on the belief that the present system can survive. Most official public planning is in this category. The aim is the perpetuation of the industrial technocracy (3).

- (4) Those based on concern for man as an individual with an inner life capable of growth.

These are vaguer in their proposals than the others. Thus far, participation groups have been lacking in strategic ideas at regional scale. The proposals of a biologist like René Dubos are a good deal more coherent as concrete propositions. Most useful, but not concrete in regional terms, are the self-actualizing psychologists (e.g. A.H. Maslow).

None of these categories pay any special attention to the emergence of the telecommunications/computer technology.

2.2.2. Technique for Extracting Key Guides or Policy Directions

The method used has been to review the literature of strategies most appropriate for our purpose and list elements. Agreement about elements was then noted. The elements were next reviewed against the three spheres of the tentative worldview. Some guides have emerged only from the worldview. The reason for this is that the categories of

strategies listed in 2.2.1. do not have the breadth of worldview required to avoid serious omissions. Thus (3) above, while paying some attention to ecology-resource questions does so usually only superficially.

Identification of key guides or policy directions will now be attempted. Authors will be listed as typical sources; the reader will find the documents in the bibliography.

2.3.1. Develop and Disseminate a New Worldview and Ethic

(The Ecologist, Simpson, H.T. Odum, Caldwell, J. Huxley)

Reasons. The need for this is dealt with at length in Chapter 1. It is suggested that guides to action cannot be properly balanced if the worldview on which they depend is not made explicit. The proposal is that a worldview based on science is capable of sustaining a viable ethic if it respects the three spheres of: man as biological entity, the self-actualizing aspirations of individuals, and the need to restructure the socio-economy (4). Basically the affirmation is that we cannot act intelligently (which means systemically) in the present crisis unless we are explicit and coherent about our worldview and build an ethic based on it. Man is perceived as at a takeoff point (5).

Role of Telecommunications/Computer Technology. By making information available and offering the opportunity for widespread discussion the technology will have the very important *early role* of helping to develop and disseminate knowledge of the emerging worldview and proposals for action. Simultaneously, the development of an appropriate ethic will largely depend on the electronic technology. To achieve these purposes the *social use* of the electronic media will need to be developed very rapidly. At present such use is virtually unknown and is scarcely expected by the public.

A beginning in the social use of the technology to develop a worldview and ethic should be made at once through access to all age groups and all classes in a region.

As rapidly as possible governments should disseminate information about the ecological situation and the non-renewable resources rates of consumption. They should stimulate and maintain discussion through the networks so that the gap between the facts and the public's views is reduced to safe proportions. All institutions responsible for education of any sort should be required to help in such a program.

2.3.2. Attention to the Condition of the Regional Ecosystem

(E.P. Odum, H.T. Odum, Boulding, Ward and Dubos, UNESCO, Caldwell)

Reasons. Care for the quality of the biosphere will mean care for the biological systems in which specific human populations exist. The literature stresses the need not necessarily for man to revert to living in 'natural' ecosystems but to move toward being much more aware of the dangers of further degrading ecosystems and reversing or at least slow-

ing up the tendency to oversimplify the regional ecosystem in the interest of short term economic payoff. Man should work with the ecosystems and should not cause more disruption than absolutely necessary. At the same time reliance must be largely placed on science and technology for our survival; a *critical* acceptance, however, has to be developed. Our present mania for economic growth is particularly dangerous to the high level viability of regional ecosystems.

Regional Effects. There will need to be a more balanced symbiosis between the urban, the rural nonfarm and the rural parts of the region. The ecosystem of the region will need to function at higher ecological levels (e.g. enhancement of diversity, improvement of nutrient cycles, etc.). Large single metropolitan areas will need to give way to a network of smaller urban centres. That is, large scale massing of populations should be discouraged. By such dispersal the expenditure of energy and other resources will be reduced and the rates of increase held down. As a result many existing smaller settlements will not only have to grow physically but will also need to become more sophisticated culturally. Much closer attention will have to be paid to controlling land use on ecological principles, and nonurban land must cease to be regarded as inferior. Greater diversity of nonurban land use may be expected to be necessary. The siting and growth of settlements should no longer be left to chance or largely economic determination.

Role of TC/C. The roles are information (played in several ways) and monitoring. The monitoring will be extensive, requiring the gathering of information about the state of the components of the ecosystem (air, water, temperature, precipitation, vegetation, requirements of nutrients to be added, pests, quality of products, heat condition of urban centres, temporary population pressure on recreation areas, flows of vehicles, stocks of commodities, etc., and some aggregate figure such as the 'ecological demand' index being made on the region). Monitoring will need to be government organized and coordinated. Monitor information should be publicly accessed in usable form uniformly over the region. The purposes of this monitor-information system will be to provide:

1. Guidance to individuals or groups on how to act in agriculture, forestry, industry (e.g. effluents), marketing with regard to environmental impacts.
2. Guidance to decision-makers in maintaining or changing land uses, in providing corrective action to deal with pollution, serious loss of biomass etc., distributing population, deciding economic policies compatible with ecological requirements, controlling population numbers, generally informing themselves about the ongoing 'fit' between the ecosystem and the socio-economy. (6)

Because of the ecological requirement of greater diversity and stability in the bioregion considerable dispersal of population will be necessary. In some measure this dispersal will mean some loss of the efficiency at present derived from the close massing of large populations. We reap economic advantage but ecological and perhaps psychic disadvantage from this massing. *A function of the electronic technology will be to*

make good the loss imposed by dispersal. The telescoping of distance is a first urgent requirement stemming from the need to pay greater respect to the biology of the region. The information, in this aspect of the role, is any information needed for the carrying on of whatever activities people wish to follow, work or other. Information here is non-specific and must be provided through channels and equipment readily accessible to everyone, with equal ease throughout the region. This kind of information can be divided into:

1. Primary information, e.g. prices of stocks and shares, facts about merchandise for sale, educational classes, news, etc.
2. Secondary information. This is information about where to apply to obtain answers to questions or obtain primary information, e.g. social service information, educational institutions information, etc.

The hope that regional ecosystems will support large human populations for long periods of time may rest very substantially on the adequacy of electronic information services in these categories.

2.3.3. Concern for the Use of Natural Resources

(*The Ecologist*, Ward and Dubos, Meadows et al., Resources for the Future Inc.)

Reasons. The curves of the rates of increase in the consumption of natural resources are exponential in form. It is clear that if these rates of increase continue some resources will be very seriously depleted within the lifetimes of many alive today (silver, gold, mercury, lead, platinum, tin, zinc by the early 1980's). Our use of these resources is at present excessive and wasteful not merely because of our 'need' for the material but because we have an economy which is structured to 'make wealth' by wasting. Aiming to slow the rates of increase in consumption of all non-renewable natural resources would have two results in application:

1. The reserves would last longer.
2. The economy would tend to move away from the use of waste as a method of wealth-production and wealth-distribution.

Regional Effects. The overall policy direction should be that of slowing the rate of increase. Some natural resources, e.g. rock, clay and sand are not a particular problem. Emphasis might be given to their use preferentially over metals such as steel although ecological damage would need watching. The use of renewable resources would be preferred where possible over the use of non-renewable. Hence lumber might be better than steel. Reduction in transportation would reduce the consumption of metals and fuels by vehicles. These changes would mean a more carefully planned use of land since land is basic for producing renewable resources. Renewable resource use should be first considered for land; it should not go to urbanization simply because it happens to be in the path of present urban growth. *This means that the question of conserving reserves of non-renewable resources is directly linked to the allocation of land for various uses.* An important overall regional

conclusion is that the allocation of all non-renewable or non-expandable (e.g. land) resources is a matter of planning and that *leaving the allocation of non-renewable resources, like metals, to the market is no more reasonable than leaving the allocation of land and its uses to the real estate market* (which, of course, planning already seeks to modify).

Role of TC/C. Precise information about resources will become more and more necessary for taking many kinds of decisions about the ongoing processes of regions. As thinking in regions means also thinking inter-regionally, this means at once some arrangements for handling national non-renewable resources in a continuous process. Furthermore, at second stage this means information about policies, decisions taken etc. The need for such information has been vividly illustrated in Canada over water, oil and northern wilderness resources (wilderness is often a non-renewable resource) in recent years. The technology should make possible a resources information system at national level, working down to regions. This could be a component of a general monitoring system.

2.3.4. Recycling of Used Physical Material

(The Ecologist, Meadows et al., McHale)

Reasons. There is a general need for economy of resources and the conservation of energy. In industry, agriculture and building the present structure of the economy generally favours the use of 'new' material over 'old' material. Such a situation must inevitably imply that all physical things, including food, become more and more expensive and out of the reach of more and more people, and we drown in an engulfing tide of industrial and domestic waste. Although recycling means some consumption of energy it seems likely to become increasingly attractive.

Regional Effects. Recycling could be in a wide variety of areas:

1. Recovery of metals by melting down.
2. Reuse of materials by reconstituting them.
3. Reuse of parts or units by rehabilitation.
4. Recovery of soil nutrients and mineral traces from urban sewage.
5. Recovery and reuse of water, and grading its uses.

Vigorous policies of recycling and recovery would have economic and social effects on the life of the region. New industries specifically connected with the reclamation processes would be established, bringing new employment and stimulating research in this field. A whole infrastructure of reclamation would develop. New linkages between industries would be forged and therefore stimulus to changes in the pattern of location of industry would appear. This would assist the emergence of new patterns of settlement generally. Extensive reclamation might well be a major lever to inducing desired changes in many areas of the region's life. By recovering the nutrients and mineral traces from urban sewage the metabolic rates of urban centres could be slowed with beneficial results in ecosystem terms, since a major objection to the ecological process of cities is that their curves of the degradation of energy fall too sharply.

Role of TC/C. A regional information system would be needed to make information available about stocks of reclaimed material and imminent demand. A reclamation stocks inventory and planning process of a centralized kind would be useful. This is in line with the expectation that greater societal planning of industry is essential if we are to change the present undirected processes of production toward socially desired ends. It is a matter for research to investigate just what the production information service of a region ought to be and the place a reclamation information service ought to have in it. Certainly prediction of planned demand would be an important element. This could presumably be done with a computerized technique delivering detailed information.

2.3.5 Development of Policies Related to Energy

(The Ecologist, Ward and Dubos, Brubaker)

Reasons. In the ecology-resources approach and in the economic perspective energy occupies a special place. In an ecosystem it is the flow of energy which characterizes the whole system. *Therefore attention to the energy flow is likely to be a key area of concern in planning.* In the economics of our urban society there is very heavy dependence on the process of concentrating energy and making it available in quantities which are far beyond the immediate input-output capacities of particular ecosystems. This is largely accomplished, of course, by using the results of photosynthesis stored over very long periods of time (fossil fuels). In many ways our present situation is most vividly seen as the relationship between these two energetic considerations – the flow of energy through the ecosystem and the injection of ‘additional’ energy into the ecosystem. This immediately reveals the *basic linkage between the ecological and the economic concepts of our thinking.* Present uses of energy resources are open to objection on several grounds, the most important being (1) wasteful use of sources thought to be potentially in short supply, (2) emphasis on the use of non-renewable resources, (3) effects on ecosystems.

Regional Effects. The following areas appear important in developing new policies:

1. Greater effort in developing energy sources which are renewable and which are pollution-free. These are: hydro-electric generation, the use of winds, solar generation, geothermal techniques, development of hydrogen technology. Atomic generation should also be mentioned as quasi-renewable since breeding is practical. Atomic reactors, however, have pollution potential because of the heat which has to be dissipated, radio-active waste, radiation and the risk of accident.
2. A slowing up of the rate of increase in the consumption of energy, both on the grounds of seriously diminishing supplies of non-renewable sources (oil and natural gas) but also because of the problems connected with getting rid of excess heat and other forms of pollution and danger.
3. More emphasis from short-term to long-term investment of energy

in the making and operating of artefacts (e.g. buildings, motorcars, physical movement).

4. The pricing of energy should relate more closely to the actual economic and social costs. At present energy and its uses have the benefit of concealed subsidies. Energy should not be dispensed solely on the basis of the ability to pay for it but in the contexts of national and regional policies of energy use overriding the market in the interest of allocation, pollution control, conservation etc.
5. The linking of energy policies to those dealing with recovery and recycling.
6. Reduction of the present reliance on combustion.

Changes in the above areas may have impacts:

1. Physical high density of people, buildings and vehicles in local concentrations tends toward higher consumption of energy and accumulation of excess heat than do lower densities and more dispersed population. High density CBD's would appear particularly offensive as excessive consumers of energy and generators of heat (with consequent air pollution results, heat island effects, etc.). Therefore the avoidance of large urban areas should be the policy for energy considerations and high density CBD's should be sharply questioned.
2. Reduction in commuting milage of all kinds but especially by motor vehicles.
3. Rationalization over the region of the distribution of consumer goods to be as economical of energy as possible.
4. Encouragement of the use of electricity over other fuels. This raises questions of distribution, research into the use of electricity for individual vehicles, etc.
5. Design buildings and groups of buildings for economy in the use of energy. This will mean, at the microlevel, finding a position of equilibrium between the benefits of open densities and their costs, seen against the benefits of high densities and their costs.
6. Longer life for durable goods, including buildings. This means longer duration for the physical manmade parts of regions (e.g. residential areas). In all, this means an economy of different emphasis from the present system. This would mean different regional patterns of physical equipment (settlements, physical communications etc.) and the life patterns of populations lived in and through this equipment.

Role of TC/C. The chief role may lie generally in reconciling the changes in patterns with the need to maintain our level of culture, and raise it. *Thus the removal of the constraints of space for as many jobs as possible would be required of the technology.* Secondly, the availability of good quality information would be vital for such things as generating energy policies and keeping such policies in touch with the electorate. *An important area will be the systematic substitution of information for the expenditure of energy. In other words we have the possibility of miniaturizing the use of energy – e.g. a few watts can be used to pass information where several kilowatts would be required for a person to undertake a physical trip.*

2.3.6. General Agricultural Policies Including Control of Persistent Pesticides and Fertilizers

(The Ecologist, Ward and Dubos, Bates)

Reasons. Many regions will be required to increase their production of food. It will be necessary to program a region's agriculture so that production will be adequate yet the relation between agricultural practice and the health of the ecosystem will be controllable. Some surveillance of the way in which land is used or is proposed to be used will be required. The use of inorganic fertilizers will need to be curtailed in favour of organic fertilizers because of the pollution of water courses and ultimate impoverishment of the soil. The control of pesticides which persist in soil, water, plants and animals is necessary at regional level because of their cumulative poisoning effect. The move should be toward the 'natural' control of pests.

Regional Effects. Agricultural policies must be interrelated with the policies dealing with the ecosystem, land use, urbanization and the socio-economy. Some clarification will be needed of the proportion of food, and of which foods, the region will produce itself and which will be imported. This implies a coming together of several areas of expertise: ecologists, agricultural practitioners, market researchers, the chemical industry, etc. Agriculture must be considered at least as important as the urban centres or manufacturing industry. The question of greatly increased input of labour into agriculture is to be considered as a socially and psychically desirable change of direction and the role of amateur or part-time agricultural activities needs careful examination. Once released from the 'city' even for only part of the week many regional citizens might well engage in various kinds of agricultural activities. Extensive multi-use of nonurban areas may be expected and is important.

Role of TC/C. Information services to farmers will be required, and information back to other decision-makers. Education in regard to agricultural activity will be an important role of the technology as agricultural activities will be required to change according to specific policies on a programmed basis over time. The reasons for policies and programs will need to be constantly brought to the notice of those engaged in farming operations, even on a small scale. The information system for agriculture could be combined with the eco-information system, so that particularly loss of diversity of species and habitat can be avoided.

2.3.7. Populations Control

(J. Huxley, The Ecologist, Erlich, Boulding, Ward and Dubos, Meadows et al.)

Reasons. It is now the explosive growth of human population in relation to the planetary biosystem which is the chief hindrance to maintaining man in his present position or improving it. The urgent need first to control the growth and reduce the numbers is generally acknowledged. A

Blueprint for Survival suggests that Britain should get its population down from about 55 to 30 million, or less. But some countries could stabilize near present levels. *Blueprint* suggests that the world population at optimum level is probably about 3000 million or less. Further, Dubos points out that the infusion of rural human stock into the cities has virtually ended in many countries. With the cutting off of this supply urban man's alienation from nature may cause him to lose some biological, ethical and aesthetic attributes if he continues present adaptations. The quality of life may thus be eroded by 'overpopulation'. Dubos' view is that we should counteract this danger by creating many diversified environments.

Regional Effects. Stabilization or policies aiming at it will mean abandonment of the current use of population growth to increase the GNP. Stabilized populations must imply some major changes in the socio-economy. Changes in population characteristics will inter-relate with the decentralization of population, work and government from present metropolitan areas. Age grouping will be affected, some regions having a disproportionately large number of senior citizens. *Communities will move toward stabilization, self-sufficiency and self-regulation.* Place of residence will tend to be more permanent. Quality of human population will become increasingly important and government will have to pay increasing attention to maintaining and improving quality. Improved health and psycho services (including 'education') are a corollary of population stabilization.

Role of TC/C. Regional 'governments' will need altogether better information about population than is at present provided by the crude information systems in use. Physical health will need to be maintained at a higher level and a watch kept for mass decline in health due to any cause, from lack of protein to overcrowding. The role of the technology here might be called population monitoring, not in the spirit of Orwell's 1984, but in order to maintain quality, detect and interpret change, and to relate population situation to resources, ecosystem condition, the level of self-actualization and the socio-economy. Information services to the public about contraception and the maintaining of a public awareness of the public's role in population control will be an important contribution of the technology. According to *The Limits to Growth* a stabilized world requires stabilization only in population, capital, and input-output rates of births, deaths; investment and depreciation to be kept to a minimum. *The information services will be required generally to serve the interests of stabilization while simultaneously fostering growth in psychic and social activity, which can be done without endangering the stabilization state.*

2.3.8. Increase Stimulus to the Psycho-Cultural Development of Man (The Ecologist, Maslow, Boulding, UNESCO, SCEP, Caldwell)

Reasons. Man is a major resource for himself. There is now a vivid awareness of the potential of the human being and an increasing desire

to move faster towards its development. This is frequently stated in outmoded economic terms, seeing man himself as an economic resource. More fruitful is likely to be a broader view which might include the idea of man's growth such that he can transcend the limitations of our contemporary utilitarian viewpoint. In the emergence of man to his present position major inhibitors of his growth have been (a) lack of knowledge, and (b) confinement to a single physical micro-environment at best only to be escaped from at considerable risk and large expenditures of time/money. The new electronic technology offers the possibility of even greater successes over these difficulties than the automotive and electrical technologies achieved up to 1940. Secondly, a major cultural change is surely well underway in that we have already moved a considerable distance from the societal irresponsibilities of laissez-faire toward an increased interest in the community giving sustained support – from economic to psychic – to the individual. We now are in a position of 'takeoff' in cultural terms, Boulding's second great 'transition of man'.

Regional Effects. There will be a greater demand for information and access to knowledge, together with a speedup in the time taken for knowledge to become readily available. New locations for the emergence of groups with cultural interests will appear as a result of information diffusion and increase in leisure time. Nonurban areas will become increasingly attractive to those who can find the means (including guaranteed incomes) to escape the cities either permanently or on a periodic basis. Workplaces will be more generally dispersed over the region. The improvement in communications will tend to increase the speed of cultural change and development, and cross-fertilization of ideas and techniques will become more common. The level of education in the population will tend to rise.

Role of TC/C. The overall role of the technology will be (a) to overcome the frictions of increasing dispersal, (b) to accelerate the rate of cultural growth, and (c) to help make possible the development and application of policies better suited than those existing to the survival and development of the human species. *This means more sophisticated regional information systems, more rapid development of knowledge, and greater stimulation to creative thinking. While population and capital (total stock of physical wealth) will eventually have to be stabilized, or nearly so, the psychic wealth will be the growth area.* This area of human development will be heavily dependent on the electronic technology, since high culture depends very heavily on communication. Ease of access to cultural material, ease of contact with others interested in the same areas, the use of the media for the free development of a high culture (rather than service to certain societal elements like production and the market), reliability of information – all these become very important and are inevitably bound up with the way we decide to manage the technology. *An important function of the technology will be to make possible and service a network of 'think-centres' whose role will be to act as a kind of systematic and synergetic thinking organ for the region.* Among other vital concerns of such 'think-centres' will be the develop-

ment and modification of values and the continuing review of existing institutions and the thinking out of new ones.

2.3.9. Increase Diversity of Physical, Social and Cultural Environments, and Improve Access to these Environments

(Dubos, Ward and Dubos, Boulding, Roszak, Caldwell)

Reasons. Self-actualizing individuals will be less and less interested in role-playing and will demand greater diversity of environment than is at present generally available. ‘Post-industrial’ society will be progressively dependent for its psychic energy on self-actualizers –*individuals who are themselves rather than the masks or facades of their roles*. It will require conscious effort to create the conditions which will help individuals toward self-actualization. A characteristic of the individual is that variety is required both for the single individual himself and as between individuals. Effort will therefore be required to generate and preserve environmental variety or diversity – physical (natural and man-made environments throughout the physical region), social (easy access to a range of societal patterns), intellectual (various areas of mental activity), aesthetic (various levels of appreciation), emotional (various kinds of interpersonal relationships), and philosophical (various worldviews and ethical systems).

Regional Effects. On the physical plane it will be necessary to stabilize many existing kinds of environment and to guard them against encroachment (wilderness areas, genuine agricultural areas, bodies of water, small urban settlements, parts of metropolitan areas, etc.). Existing social groups will need protection and space to grow and new communities and new kinds of communities will be needed so that individuals may have a wide selection in their choice of social life (meaning relationships defined as the individual participating with others). Intellectual diversity will mean easier access to knowledge and the individuals and groups who handle it, together with an expanded possibility for the exchange of ideas throughout the region, *the centre having no preferential position over the rest of the region*. Aesthetic diversity means making the arts more generally available, the ending of the supremacy of the metropolitan core as the only place where top quality offerings may be appreciated. *Emotional diversity will mean changes in interpersonal behaviour patterns and will need the development of means for making information about the personal characteristics of individuals available through some safeguarded system*. Philosophical diversity will involve the generation of groups holding different worldviews, their protection and provision of information about them.

Role of TC/C. The guide or direction of diversity is in many ways the most all-embracing of the directions in which policy should be headed. It means pre-eminently knowledge, or information of a high order, easily accessible and unpolluted. It also means the ability to transfer electronically the offerings of the performing and visual arts, and music. It is of extreme importance that the knowledge, or information transferred by

the electronic systems shall be as pure as possible and not contaminated by the desires or aspirations of those who control the systems which make it available. In our present world the polluted information of the press and the electronic media may be a very serious impediment to our survival. Control of pollution in the information environment is therefore as important as in the physical environment. The technology will have the responsibility of making available at regional level information about the emerging global superculture.

2.3.10. Move from an Economy of Flow to a Socio-Economy of Stock (The Ecologist, Theobald, Meadows et al., Fromm)

Reasons. If we accept the need to control our use of certain non-renewable resources because of impending exhaustion it will be necessary to make manufactured objects last as long as possible instead of wearing out quickly so that the level of production may be maintained or increased. Another way of saying this is that the production flow needs to be controlled at the societal level and not left exposed to the vagaries of individual initiative. We should be thinking, therefore of a society which has a relatively stable capital of long-lasting goods which are replaced when necessary, rather than an ever increasing flow of goods through the system. This is, of course, a very major change in the socio-economy.

Regional Effects. The policies of the regions would no longer be focused on economic growth; the dynamic of growth would shift from economic to cultural. Location of industry would be freer because the competition element would be different, there being a premium on good quality production. Advertising would be a matter of information not a process for pushing excess production through the market. It would be important to know the role of the region in contributing to the replacement of the nation's stocks. Presumably regions would have different roles based on skills, availability of resources and population mass. The emphasis on the micro-division of work would likely change, as indeed is already appearing in industry. This would mean other changes in the nature of industrial work. This in turn would affect the geographic distribution of work. As more 'work' would be brain work, or productive not of objects but of psychic output, the tendency will be for some work to be generally distributed throughout the region.

Role of TC/C. The telecommunications network will have a very important role in stimulating the switch from physical production being the growth sector to psychic activity being the main area of growth. As the society will have to be culture-rich rather than material products-rich the technology will be directly under pressure to grow rapidly. *The electronic technology will also have the responsibility for seeing that there is minimum of waste caused by slow and poor quality decision-making so that the highest physical level of wellbeing is achieved within the limitations of general policies of stabilization. That is, the technology will have to assist us to reach the highest possible plateau on which we can*

stabilize and stay stable. In all this area the maintenance of the knowledgability of the top level decision-makers will be of key importance. A present problem is that the best thinking of the time does not penetrate government quickly enough, or thoroughly enough. So, *A Blueprint for Survival* is able to quote a British minister, responsible for advising the cabinet, to the effect that no studies were being undertaken that would require an environmentalist or an ecologist! The telecommunications technology will have an increasingly important role to play in helping define what we mean by environmental planning.

2.3.11. Extend Wealth Distribution Mechanism beyond the Linkage between Production – Job – Money – Consumption (Theobald, Ward and Dubos)

Reasons. Broadly speaking, except for children, students, the old and those on some form of public support the ability to buy from the stock of goods and services produced is dependent on money earned through participation in the production process (job). The declining workability of such a system in the face of heavy pressure toward automation (which eliminates jobs) and the possibility of having to develop socio-economies which are much nearer stability than our present ones, is becoming obvious. Health and education services, expanding unemployment and welfare financing, government stimuli to the creation of new jobs, and schemes such as Opportunities for Youth and Local Initiatives Programs in Canada are evidence of society's response to this particular area of change in the socio-economy (7). A current favorite area of discussion along this line is the guaranteed income (8).

Regional Effects. For those for whom subsistence is not dependent on a city job there will be a relaxation of the 'need' to live in or near the metro itself. Some will therefore move into rural areas or smaller settlements. The types are: those willing to live on a guaranteed basic income, retired persons, individuals who, though dependent on an urban-centered job can be freed locationally, hybrids who may be able to live partly on a guaranteed income and partly on an earned income implying living partly in the metro and partly out of it. Drastic changes in population distribution over the region could well result. This would dovetail with the ecological and psychic need for some dispersal of our large metro populations. The qualitative differences that exist between metro and non-metro residents would be reduced and the demand for metro-level services and accessibilities on a region-wide scale would be increased.

Role of TC/C. An effect will be the increase in free time by considerable numbers of the population. Avocational activities will therefore increase. These are likely to make increased demands on the telecommunications services. Greater participation in public debate will require greatly enhanced facilities for quickly and cheaply eliminating the friction of distance. Greatly increased educational use of telecommunications may be expected, educational services of equally good quality being required widespread throughout the region. As free time relates

also to entertainment the change in wealth distribution will increase the demand for leisure activities throughout the region. Inevitably a large part of this demand will be satisfied through telecommunications. It will probably become a matter of increasing concern to 'governments' that the public has adequate opportunities for using leisure in ways that are not destructive. The linkage between leisure time and the achieving by the individual of basic psychic satisfactions is a matter which decision-makers will hardly be able to ignore. The role of telecommunications is likely to be very important here.

2.3.12. Decentralize the Politics of Metros into Greater Metropolitan Regions

(Dubos, The Ecologist, Ward and Dubos, Mumford)

Reasons. Work, social life, 'government', leisure activities and personal services will require a large measure of metropolitan decentralization in a stabilized socio-economy. Decentralization will be necessary to reduce consumption of energy, non-renewable resources, physical movement, and to improve the steady state level of the ecosystem of the region by more highly developed agriculture, improving nutrient cycles and increasing the diversity of the biological process. In psycho-social terms there is need to give populations relief from the present pressures of the disintegration of life in large urban centres, which can perhaps only be tackled by decentralization. Decision-making must follow the move from the central hub and as far as possible individual settlements must be responsible for making their own decisions. *Political decentralization is intimately related to the desire for self-actualization.*

Regional Effects. The pattern will be a regional web of many varying sized places with perhaps one or two larger ones. The concept of a city-centred region consisting of a large metropolitan area and a few small places is no longer to be regarded as the model. The web of settlements will be integrated by two technological systems – the physical communications and the telecommunications. Increasingly the telecommunications will become the more important and will be the main means of maintaining the region's entity. Adverse effects on the environment will be reduced by decentralization and there should spontaneously appear a regional morale sensitive to the condition of the ecosystem. Settlements will in all regards by much less dependencies on 'higher' levels. The hierarchical organization of settlements will decay in favour of a systemic emphasis in relationships. A more diversified urban-rural mixture will be the characteristic of the region. Individuals will participate more significantly in the decision-making processes of both their local communities and the region as a whole. *New organs of socio-decision-making will have to be created to make possible participation at regional level in ways at present very difficult to envisage.*

Role of TC/C. Telecommunications will be required to ensure the continuation of the many benefits at present resulting from the piling up of large populations in relatively small space. They will also have to sub-

stitute for much present physical movement. This is essentially a role of conserving energy. Information services for industry, business, the purposes of 'government', personal services and personal development, and the control of the ecosystem will need to be developed progressively but rapidly so that they are ready to dovetail with other changes as they emerge or are consciously injected into the polity. *In societal terms the technology will be called upon progressively to make good social contact lost through decentralization.*

2.3.13. Land Use Will Increasingly be Decided According to Societal rather than Market Criteria, with a Reduction of the Fixation on the Importance of Real Estate and Other Physical Goods (Galbraith, Theobald, Brubaker)

Reasons. The present determination of land uses is largely a result of a laissez-faire market in land. This produces patterns of development and human behaviour which are wasteful of energy and other resources, cause unacceptable pollution, degrade agriculture, deprive ecosystems of their complexity, diversity and stability, and cause depletion of human resources by encouraging poor levels of physical and mental health. The free market in land is closely tied to the present phenomenon of large masses of population, with inevitable congestion. Planning is not at present able to touch more than the fringe of this problem. Increasingly land must be seen as a public good if we are to achieve permanently stable patterns of settlements. Present metropolitan areas and their regions should now be regarded as very seriously unstable. The disappearance of oil or its heavy increase in price would show this at once.

Regional Effects. The increasing determination of land use according to societal criteria will bring in the idea of overall purpose. This will help make successful policies of decentralization. It will also help to stabilize the use of land for agricultural purposes since urban use need not be regarded as a 'higher' use than agriculture. Physical communications investments need not follow the market in the sense that 'governments' need not put in roads or public transit systems to serve a 'demand' which is outside their control in its emergence. The move away from the city-based region toward the achievement of the regional web of settlements would thereby be helped. Further, in thinking about transportation the web could be planned to place much more reliance on movement by rail than at present. The problems of energy supply will force change in this direction. Movement of freight by rail is much cheaper than by road, and the present heavy use of trucking must be regarded as a temporary condition.

Role of TC/C. The society will need to make a major change in values in giving up or heavily modifying its reliance on the ownership of land and buildings as a repository for wealth and a basis of security. The security question seems likely to be dealt with by further movement by society in the direction of supporting the individual in his basic requirements – shelter, money for necessities, health and educational services

etc. When supported in this way the psychological value of property as a security need not be so great. The repository of wealth idea is not as easy and substitutes are difficult. Thus far, physical property has been used in Western countries as a most important counter to inflation. In a modified socio-economy inflation may be mastered. In a society of stabilized capital, however, property may become ever more valuable and desirable and the stock of it will increase only very slowly. Other forms of possession or ownership than of physical goods will need to be developed. *A most likely form would appear to be 'psychic' ownership, i.e. the development of the potentialities of the human being. It may be a very important role of the telecommunications technology to help develop this kind of ownership as soon as possible.* This will mean not merely making information available on an altogether higher level than at present, but will imply the deployment of this information in ways that will give individuals access to new knowledge, and the provision of new opportunities for combining it synergetically, leading to further psychic development. *This means that there must by symbiotic development of the technology, the substance the technology handles, and the psycho-social purposes pursued by the society.*

2.3.14. New Policies for Physical Communications (Galbraith, The Ecologist)

Reasons. Movement is regarded as the catalyst of urban processes. This view should be modified to include telecommunications. It is the proportions in which they are mixed and the rapid enormous improvement in electronic communications in relation to the physical capacities which produce a new situation. The observed centrifugal dispersal of metropolitan populations and work opportunities into their regions must be attributed to extensive developments in physical communications and telecommunications. The great improvement in telecommunications and the immediate potential will continue and encourage this centrifugal process. The process in total is very complex but emphasis may be placed on (a) the idea that substitution of physical movement by electronic passing of information takes place on a progressive basis, and (b) new transactions over distance are made possible on the basis of both technical and social invention.

Regional Effects. Combined with change in other components of the culture (e.g. affluence, redistribution of wealth, leisure activities, the work-week) the impact of the telecommunications technology will be to disperse populations more generally over metropolitan greater regions. As a result physical communications will need to change. Although commuting may be less frequent (e.g. on a weekly instead of a daily basis) it may well change to a much longer trip. Most of our thinking about commuting is now obsolete or obsolescent because geared to daily movement. We should now use the week and the month as the time units for regional thinking. Because commuting trips will lengthen, improved long distance roads and rail links will be necessary. Exurbanite living will become feasible for relatively large numbers of families. For these,

both physical and electronic communication of high quality will be necessary. With dispersal will come a loosening of the bonds which at present bind industries to preferred locations. Therefore the contemporary growth pole policies will become less significant in regional thinking. The direction of change may be toward something like Frank Lloyd Wright's rural-urban regional pattern not because of the motor car (as he substantially thought) but because of the superimposition of the newer telecommunications technology on regional patterns developed under the pressure of automotive technology and the first phase of telecommunications (say the telegraph and the telephone up to 1940).

Role of TC/C. Assuming centrifugal dispersal through the greater metropolitan region the function of the electronic technology in this perspective will be:

1. Substitute for some existing physical movement.
2. Reduce the level of intensity of some physical movement.
3. Change the trip length and its time frequency.
4. Reduce intra-metro commuting and loosen up its peak hours.
5. Cause changes in policies dealing with physical communications.
6. Cause increase in accessibility to hitherto not very accessible parts of the region.

In combination with changes in the physical communications the above will reciprocally relate to:

1. Tendency to equalize the quality of services throughout the region.
2. Decentralization of jobs from metros.
3. Generally loosen the inhibitions caused by the friction of space.
4. Reconciliation between the drive toward dispersal and the need for concentration to maintain our general cultural level.

The importance of systemic thinking and planning is most vividly seen in this area. The inter-relations most likely to repay study are of this kind: physical movement – telecommunications – changing workweek – guaranteed incomes – changing tastes in leisure etc. – rethinking of economics. *The present habit of planning physical communications without consideration of telecommunications is dangerously archaic.*

2.3.15. Develop a Socially-Directed Knowledge System (Theobald, Fuller, SCEP, Caldwell)

Reasons. An important requirement of a society dedicated to greater control of itself (now inherent in the thinking of many ecologists, economists, educators, planners, and others) is a network of individuals and groups who are responsible for the thinking work necessary for developing the process of control or guidance. Such individuals and groups would not only be responsible for being continuously informed as to what is going on (the changes, their impacts etc. arising from new conditions or injections of technology or development of psychic potential) but would be required to be thinking about changes necessary, varying from modifications of values to the introduction of new technology. A continuous societal thinking process with regard to both values and

technology appears particularly important. This process would be very much dependent on synergetic techniques. This thinking 'head' of the society would need to have three major linkages:

1. With the public at large so that its opinions, values, attitudes may play their role.
2. With the process of what at present is called education so that the development of individuals is closely linked with quick access to the key thinking processes in the society.
3. With 'governments' so that necessary action can be taken in accordance with the results of the 'head' thinking processes, and so that governments in all action will have the benefit of the best available knowledge.

Regional Effects. 'Think' individuals and groups will need to be dispersed throughout the region. *The contemporary unbalance in which thinking is mainly a metropolitan-based function must be redressed.* Our present thinking is often virulently centralized, a metropolitan planning function, for example, being heavily coloured by the fact of location in city hall. These 'think' individuals and groups will develop prestige in all nodes of the regional web. They will need to be closely connected with the local processes of 'educating' the various age groups in the local area and gathering information about changes in values and attitudes. As 'government' will be decentralized, 'local government' should find it has some of the best and most experienced minds at its disposal – a situation at present rare except in some areas of the metropolis or privileged exurban areas.

Role of TC/C. Special facilities may be necessary for the 'think' individuals (Brain Net) or groups at the local level. They may need to have easier, more widespread and perhaps cheaper access to various information systems and processing techniques. *The aim must be to achieve much faster dissemination of new ideas than is at present achieved through the slow processes of print, the spoken word, think-tank techniques and casual contact.* A useful idea might be a special information channel which would allow key 'think' individuals to record ideas in the system. These could be accessed by anyone. Thus once a week, say, an individual could devote a period of time to retrieving at his own leisure the ideas recently deposited. Thus ideas could be quickly transmitted from individuals to others, worked upon, and comments etc. put back into the system. *In this way really creative individuals would be quickly identified and simultaneously their creativity would be stimulated by feedback from others.* Much of this material would get into the more routine education system and so ideas would receive rapid and wide dissemination and, if useful, discussion. Perhaps the most important factor here is the need to find means (and they will have to be electronic) for generating new ideas and getting them rapidly across to others – first the other key 'think' individuals and groups, and second to the population at large. The responsibility for developing this kind of service would appear to rest heavily on the idea of using the technology for socially-directed ends.

2.4. Conclusion

In this chapter we have extracted from the literature and the components of the worldview developed in Chapter 1 important directions in which regional policies should be moved if we are to pay heed to ecological needs, the full realization of man's psychic potential and the reconstruction of the socio-economy. We have mentioned some of the likely manifestations of these directions on the settlement pattern and lifestyle of the greater metropolitan region, and suggested what the particular role of the telecommunications and computer technology might be in assisting the pursuit of these directions and in overcoming some of the disadvantages they may present when compared with present conditions.

In the next chapter we shall use these directions to develop scenarios of the new conditions arising. In these scenarios we shall pay special attention to the ways in which the telecommunications and computer technology may contribute to each scenario.

- (1) Mumford, "Megalopolis as Anti-City".
- (2) This statement can be made because those who think crisis is present make proposals; those who do not think so do not make proposals.
- (3) See Roszak, *The Making of a Counter Culture*, Chapter 3.
- (4) Some of the young may be repudiating the scientific or Apollonian approach. Marcuse tries for the idea of a society based on the non-Apollonian characteristics of man in *Eros and Civilization*.
- (5) See Teilhard de Chardin, *Activation of Energy*.
- (6) It is preferable to think in terms of decision-makers rather than governments.
- (7) Masuda in *The Plan for Information Society* proposes a third sector, after the public and the private, to deal with these new elements. The effort of Professor Y. Masuda and his colleagues to produce a plan for the transition of Japanese society into the information society is extremely interesting. A criticism is that it does not enquire in any depth into the basic cultural issues we face but rather starts with the assumption that extensive computerization (about 67 billion dollars by 1985) will deal with these issues.
- (8) A criticism of the emphasis used here is that it does not attempt any depth analysis of the present economy. A justification for the stance is that without such depth analysis it is useful to use the linkage given as sufficient to give new lines of thought.

CHAPTER THREE

SCENARIOS TOWARDS THE INTEGRATION OF FUTURE CULTURAL PATTERNS, HUMAN SETTLEMENT PATTERNS, INFORMATION AND THE TELECOMMUNICATIONS AND COMPUTER TECHNOLOGY

3.1. Introduction

Having suggested a provisional worldview and having extracted from it and from the literature some directions for future policies, it is now possible to attempt scenarios. These will result from synergetically relating the various elements uncovered.

At this point certain important conclusions emerge:

1. Telecommunications and computer technology must not be considered only within the context of our culture as it exists. New contexts need to be developed. These are already emerging in the more imaginative literature.
2. The electronic technology and the roles which it is to play have to be symbiotically developed. Questions about the development of the technology must be examined along the perspective of how the society will grasp the opportunities it offers.
3. The information age will appear transitionally as the myths, values, institutions and roles of the industrial era disintegrate. The telecommunications and computer technology must be used consciously to assist the transition.

3.2. Systemic Foci for the Information Age

It becomes clear that an essential characteristic of the material to be handled is inter-relatedness. This inter-relatedness is simultaneous and does not manifest itself in sequential hops.

Planning methodology has hitherto largely been linear, proceeding from the establishment of goals, through research, preparation of alternative lines of action, evaluation and selection of a final plan, and implementation with some feedback. *This sequence must now be superseded by simultaneous handling of these elements. Goals are now not as useful as we thought and must be replaced by directions in which policy must be moved. Above all, planners have to learn to think forward synergetically.*

To accomplish this change the methodology of planning will have to become systemic, organic and not mechanistic as at present. There is now in the literature of planning considerable systemic material as methodology. Its weakness is that so far there is very little work on relating the method to the kinds of substance that we are handling in this research (1). The electronic technology provides the vehicle for doing this.

The following *regional subsystems* are suggested as simultaneously interacting key elements (see Glossary):

Popusystem The subsystem of population – national or GMR. The possibility of reaching steady states or a decline in numbers followed by steady state may replace the present assumptions of perpetual population growth.

Ecosystem Regional ecosystems will need to move toward higher levels of stabilization, increasing in complexity and diversity. The ecosystem should provide the recognized bio-context for the socio-economy. Ecosystems in aggregate become a planetary concern (acknowledged, for example, by the Club of Rome).

Psychosystem The interior life of man will be a much more important growth area. Essential is the self-actualization of the individual coupled with the stimulation of synergetic techniques. The psychosphere (noosphere) ranges from the micro-spatial to the planetary. The products are psychofacts – knowledge, interchange of feeling, expressions of intellect and emotion, creative and appreciative activity. *The psychosystem interacts with the socio-ecosystem particularly in regard to worldviews necessary for maintaining the planetary system of man-in-the-biosphere.*

Socio-Ecosystem This will be increasingly related to the ecosystem of the region. The need to modify the behaviour of human communities toward a better symbiosis with the ecosystem on the one hand, and the thrust toward self-actualization in the psycho-system on the other mean very major change in the socio-ecosystem. This subsystem includes ‘government’ as well as decision-making concerning production and the quality of life, with special attention to the linkage: production – distribution – use – recycling – control.

Spatosystem *The chief characteristic may be decentralization of the present metros into their greater regions and a repopulation of some regions.* The new greater metro region is a web of settlements of varying sizes, with many of them quite small, middle-sized perhaps 75,000 population, and a few larger. Existing metros may break up into self-governing fragments. Some will be physical abundance regions; others will be sub-abundance regions. Implied is some solution to the wide gap between the rich and the poor regions. Integration of the parts of the decentralized region will be largely electronic, but physical movement and energy distribution networks will continue important.

Technosystem It includes the whole technological universe since our approach to technology must now be that of seeking to use it in accordance with ecosystem limitations and psychosystem potentials. Key aspects of the technosystem appear to be: the use of non-renewable resources and the intensive development of renewable resources, energy questions, concern for damage to the biosphere, and awareness of danger in the psychosphere (alienation, violence, etc.). In these the electronic technology is of crucial importance through its capacity to help generate and handle knowledge.

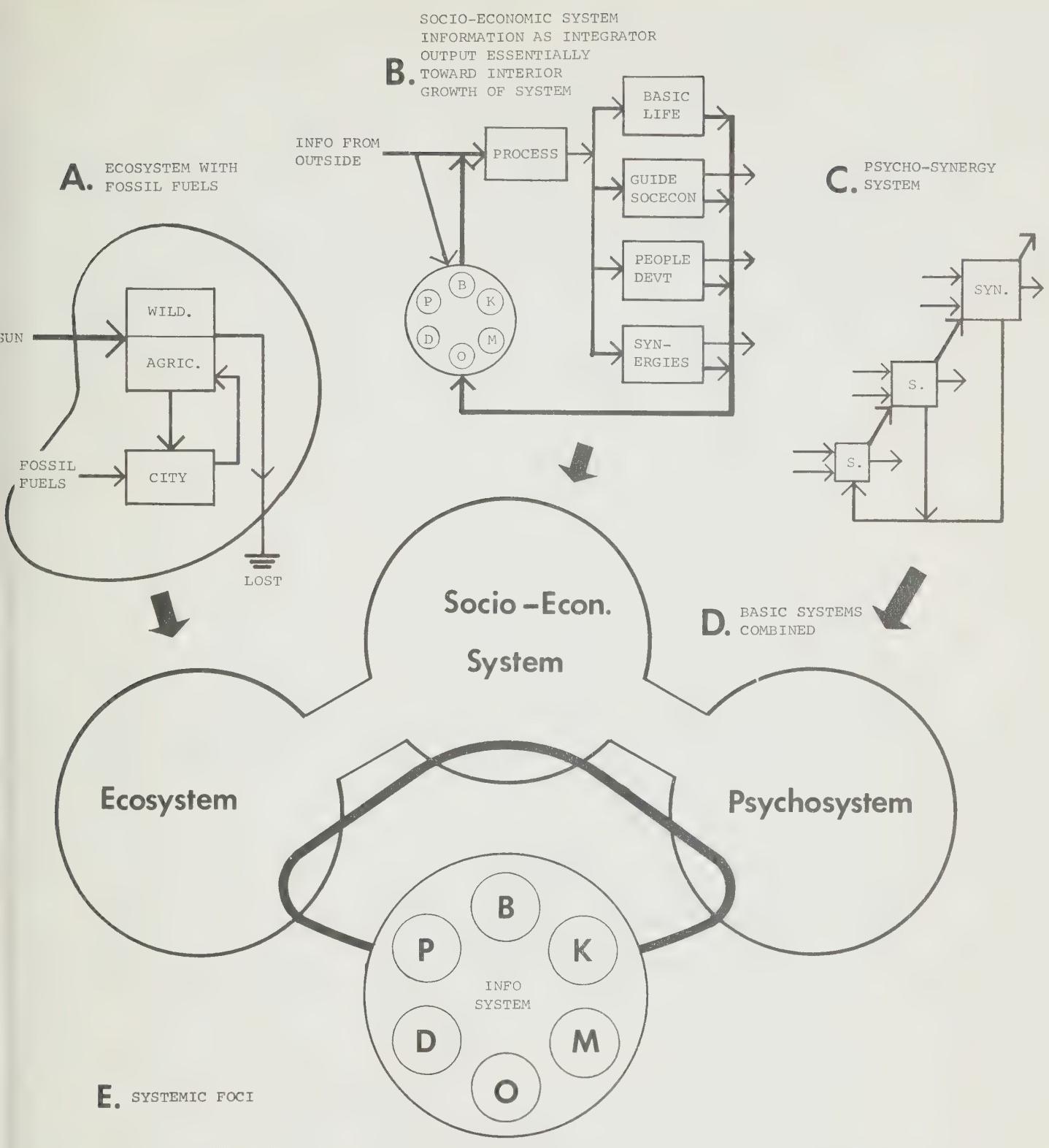
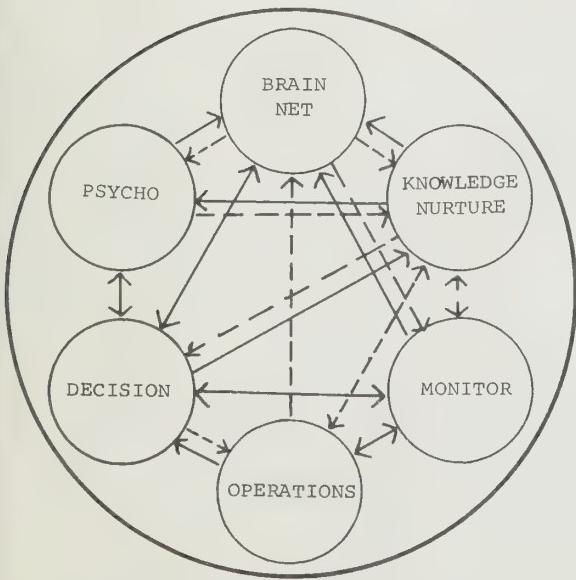


FIG.1 Systems



HARD LINES ARE FLOWS OF ADVICE
DOTTED LINES ARE FLOWS OF INFO

- A.** ECOSYSTEM: A VERY MUCH SIMPLIFIED STATEMENT OF ENERGY FLOW. PHOTOSYNTHESIS IS THE INTEGRATOR
- B.** SOC-ECONSYSTEM PERCEIVED AS INTEGRATED BY GENERATION AND FLOW OF INFORMATION AND NOT CAPITAL-MANUFACTURE
- C.** PSYCHOSYSTEM INPUTS ARE PSYCHIC ENERGY FLOWS. SYNERGY IS INTEGRATOR. SYSTEM ITSELF IS CUMULATIVE.
- D.** WORLDVIEW: BASIC FOCI AND RELATIONSHIPS WHICH MUST BE MAINTAINED.
- E.** LINKAGES BETWEEN FOCI OF ACTIVITY. TELECOMMUNICATIONS HAVE KEY ROLE IN EACH ACTIVITY AND IN LINKING.

REGIONAL NETS

Brain Net

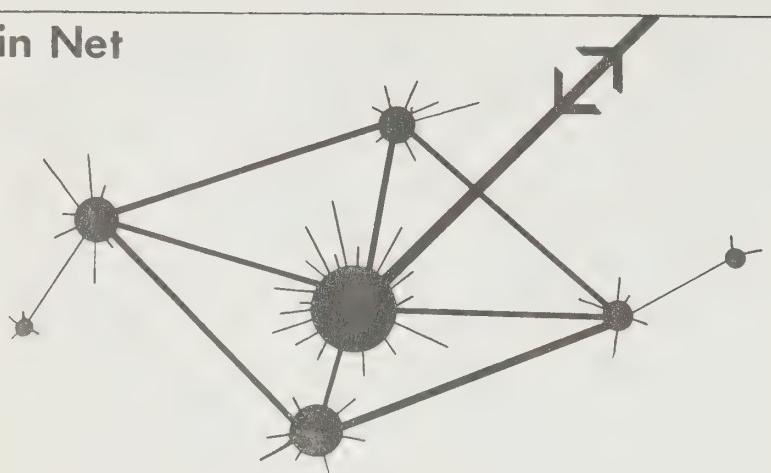
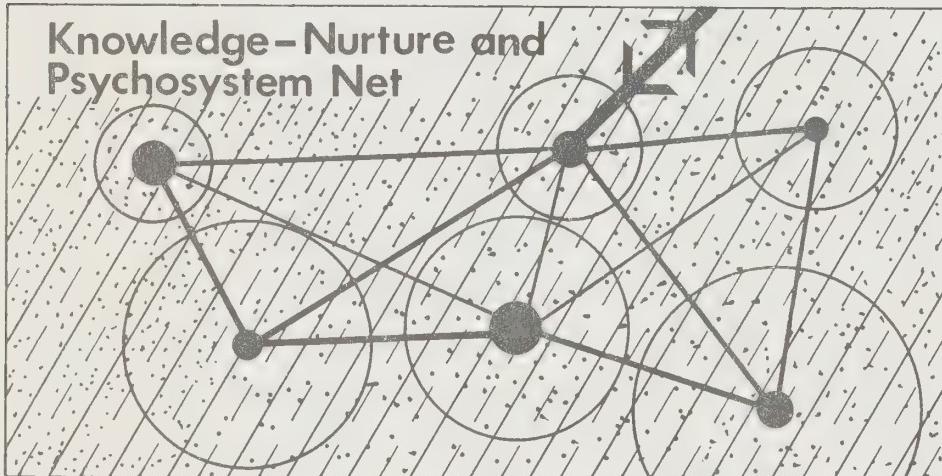


FIG. 2

SELECTED INDIVIDUALS LINKED TO PROCESSING NODES LOCATED POSSIBLY IN UNIVERSITIES. CONTINUOUS INTERACTION OF IDEAS AND DISCUSSION ON THEIR SOCIAL IMPORTANCE.

Knowledge-Nurture and Psychosystem Net



[Dotted Box] 1-WAY RADIO AND TV

[Solid Box] FULL 2-WAY INDIVIDUAL CAPACITY

[Hatched Box] SOME GROUP PARTICIPATION CAPACITY

Societal Decision Net

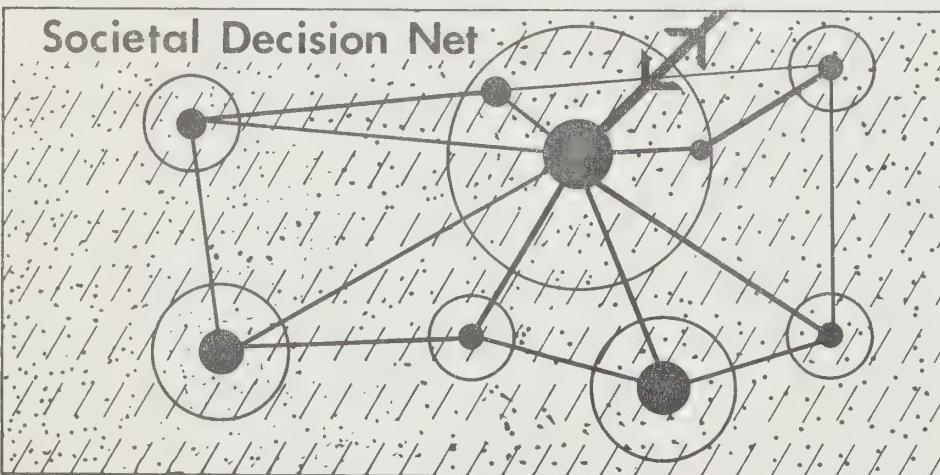


FIG. 3

INSTITUTIONS RELATED TO THE INNER DEVELOPMENT OF THE INDIVIDUAL, LINKED ACROSS THE REGION SO THAT ALL CENTRES CAN ACCESS ALL RESOURCES. THE CIRCLES REPRESENT AREAS OF SPECIAL DIFFUSION AND INTERACTION POTENTIAL. USE ALSO OF 2-WAY INDIVIDUAL AND GROUP PARTICIPATION CAPACITY PLUS 1-WAY MEDIA.

FIG. 4

LINKING OF DECISION-MAKING GROUPS - GOVERNMENT, BUSINESS, SOCIETAL MATTERS. SOME GENERAL GROUP PARTICIPATION CAPACITY OVER THE WHOLE REGION. THE CIRCLES INDICATE AREAS OF SPECIAL DIFFUSION AND INTERACTION POTENTIAL. THE LARGER NODES ACT AS COLLECTORS AND SWITCHERS FOR THE SMALLER NODES. COMMON 1-WAY DIFFUSION THROUGH THE MEDIA.

FIG. 5

A CENTRALIZED SYSTEM OF COLLECTION OF INFORMATION ABOUT THE VARIOUS ENVIRONMENTS. THE USE OF PRE-RECORDED INFORMATION ACCESSED THROUGH INDIVIDUAL 2-WAY PUBLIC SYSTEM. MINOR CENTRES ARE CAPABLE OF ISSUING THEIR OWN LOCAL INFORMATION AS INDICATED BY THE CIRCLES.

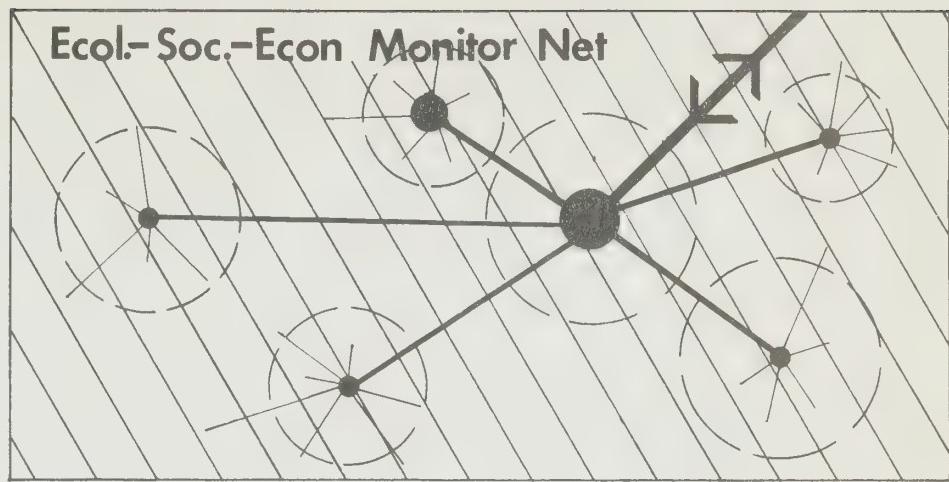


FIG. 6

A CENTRALIZED SYSTEM FOR IMPLEMENTING DECISIONS OF ALL KINDS WHERE CENTRALIZED ACTION REQUIRED. THE SMALL NODES ARE INDEPENDENTLY CAPABLE OF LOCAL ACTION WITHIN THE FRAMEWORK PROVIDED BY THE SOCIETAL DECISION NET.

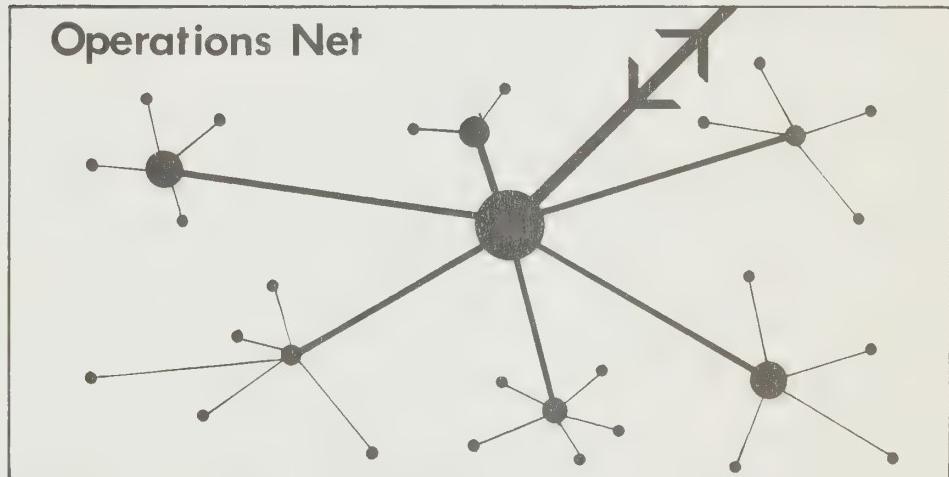
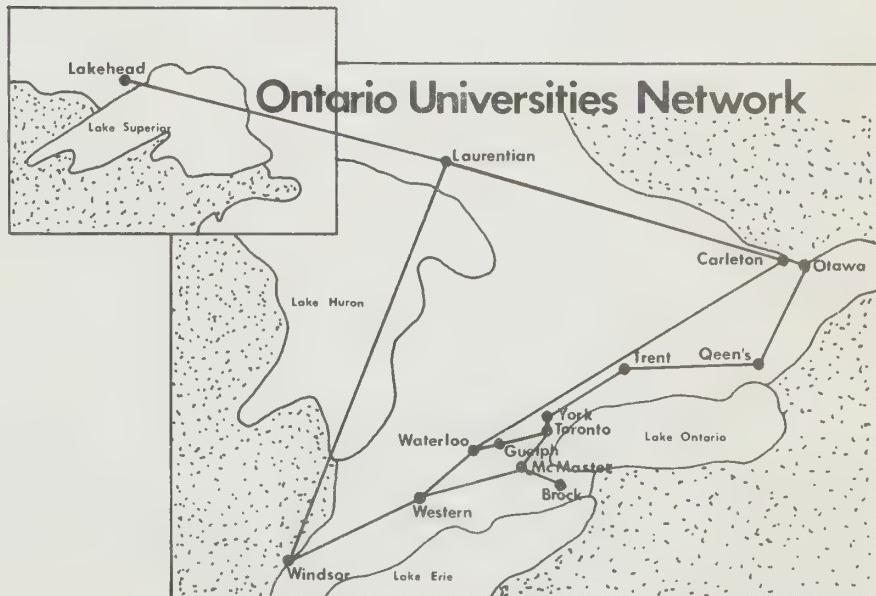


FIG. 7

THE COUNCIL OF ONTARIO UNIVERSITIES HAS STUDIES FOR THE LINKING OF THE UNIVERSITIES OF THE PROVINCE TO ACHIEVE A HIGH LEVEL OF RESOURCE SHARING.



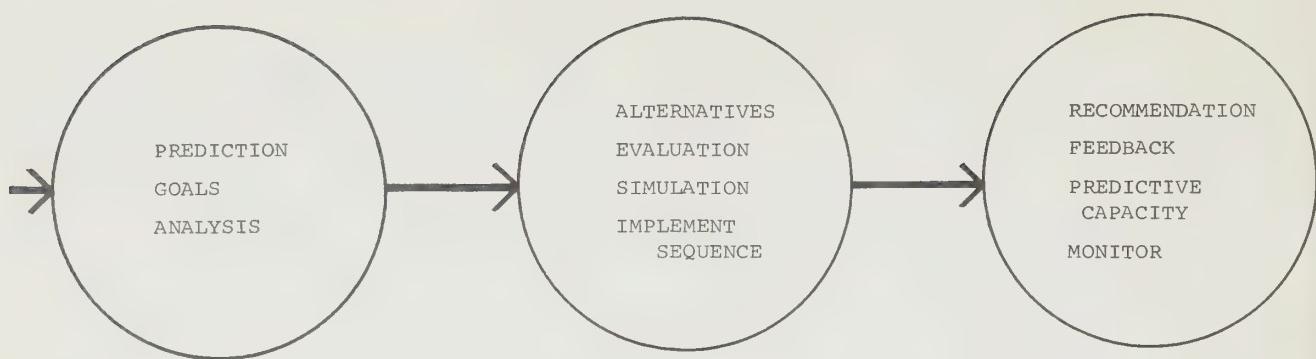


FIG. 8

A. ESSENTIALS OF BASIC SYSTEMIC PLANNING

B. SUGGESTED CONTEXT FOR SYSTEMIC PLANNING

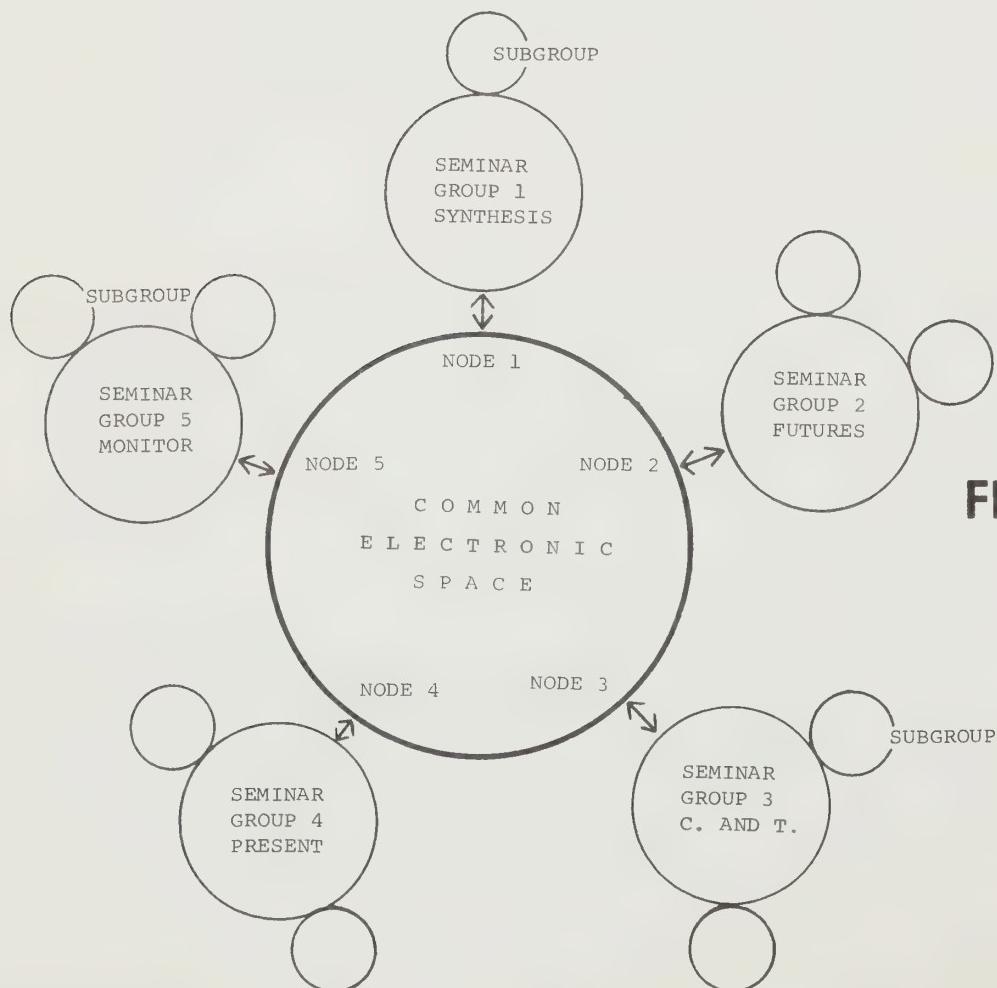
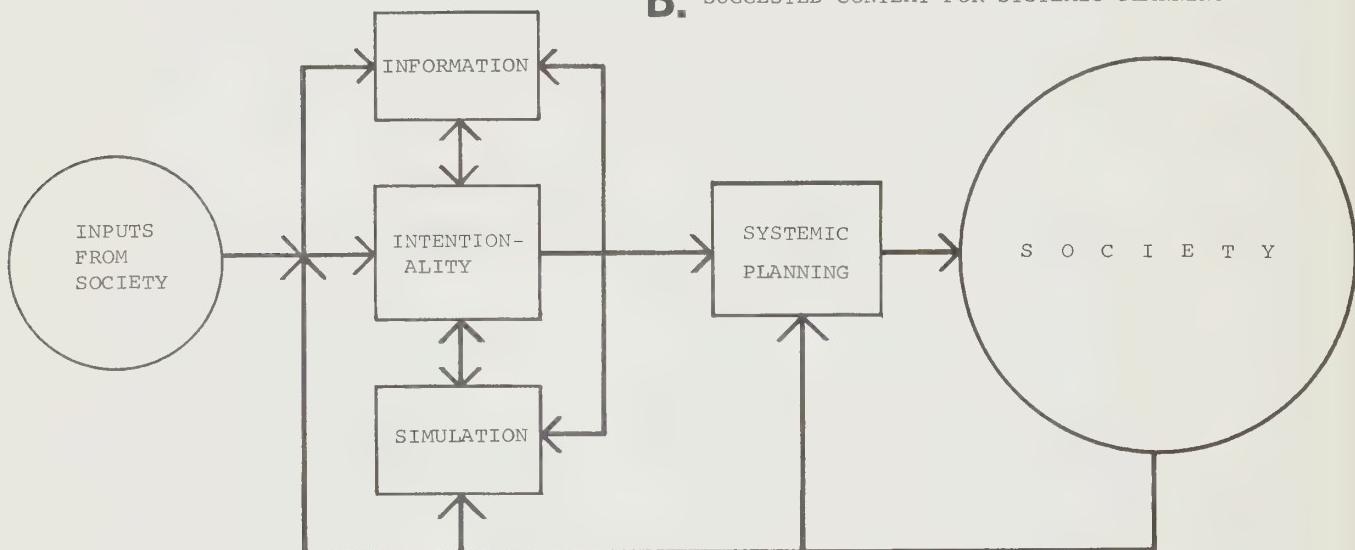


FIG. 9

ORGANIZATION OF EXERCISE NO. 3

Most significantly, the requirement of decentralization in the spatiotoposystem may only be achievable without entropy in the socio-ecosystem if the electronic technology can make good the present benefits derived from large masses of people being near together (2).

Further, it is likely that the synergetic knowledge required can be developed and put to use only by means of the electronic technology since the older technologies (books, universities etc.) unassisted are now too slow and erratic to meet the present urgency for action.

Infosystem As physical communications and industrial production were major integrating principles of the industrial era (1700 – 1940) so the integrators of the information age will be the telecommunications technology and the generation of psychofacts. The infosystem will be a congeries of different information sub-systems having different specific functions, for example: a system for monitoring the ecosystem and the interaction of the socio-ecosystem with it. Compatibility of working will be essential. Perhaps the key information sub-system will be that which does the top level synergetic work (Brain Net).

There follow six scenarios in areas considered of prime importance.

3.3.1. Scenario: Assumption of Very Little Use of Oil

1. The energy supplied for consumption is assumed to be mostly electricity. What oil there is would be from coal and would be in very short supply. The electrical energy would be supplied by nuclear fission and fusion, solar and tidal techniques.
2. A most serious impact of such a situation would be major change in the use of the motorcar. The possibilities are:
 - (a) Virtually no private cars.
 - (b) Some shorthaul electric cars, assuming the problem of light-weight local generation or storage of power cannot be solved.
 - (c) Cars as at present assuming the power problem can be solved.
3. Whatever the choice in 2 much more energy than at present will have to be transmitted through power lines. These will strongly influence the pattern of settlement.
4. The pattern of settlement will tend toward decentralization. Settlement, will imply nodes arranged in conjunction with the power lines grid.
5. We have to combine decentralization and heavy reliance on electricity with (a), (b) and (c) in contrast with our present reliance on individual transportation and movement of freight by truck.
6. If there are virtually no private cars, transportation must be public: intra-settlement electric rail (includes trolley), inter-settlement electric rail. These are strictly linear at micro – and macro – scale. We thus have a system of settlements or groups of settlements served internally by light electric traction and linked together by high speed passenger and freight linear links. This pattern would meet the needs of decentralization and could assist the needed relating of urban settlement and agriculture in viable ecological sym-

- biosis. Power lines would follow the inter-settlement lines and would make industrial activity freely possible in all settlements.
7. If shorthaul electric cars for passengers are possible the intra-settlement rail system could be reduced (though not eliminated). Cars might be privately or community owned and operated on the dial-a-bus principle through the settlement infosystem. Intersettlement movement would be by electric rail.
 8. In alternatives 6 and 7 the distribution of household commodities presents a problem. At present a major use of the motorcar is the trip to the supermarket. These trips represent a major segment of any settlement's total transportation system. The physical spread of each settlement may be dependent on the workable radius of food etc. distribution from a central depot (rail).
 9. Both alternatives present very serious difficulties for movement in rural areas. Farmers would have to have preferential use of what oil is available. This problem also reveals the difficulties of exurbanite patterns of land use and suggests that the densities of settlement should be relatively compact, there being nothing between the dispersal necessary for the farming population and the density of the urban settlements.
 10. In both alternatives the responsibility on telecommunications for providing the alternatives for physical movement would be very heavy indeed. If the technology is not adequately developed the settlements would become increasingly isolated and regressive conditions might overtake the entire region. The responsibility for maintaining the region in a condition of negentropy would largely rest on the electronic technology. *If this arm of this scenario is the more likely then it is very important that the move toward the substitution of physical movement by information passing be pushed hard immediately.*
 11. Both alternatives imply that the growth of settlements shall be strictly controlled so that their spatiotsystems remain within the limits of their transportation capacities.
 12. If the electric car becomes as workable as the present gasoline car the distribution of household goods, the access of the farmer to the urban settlement and the mobility of the urbanite become once more physically possible. A car might consume annually 10,000 kw hours (10,000 miles). This would add about 10,000 million kw hours to the electrical load of a region having 2 – 3 million people, or would roughly increase the per capita consumption from 10,000 to 15,000 kw hours per annum (3). This is by no means outside our capacity although it must be remembered that from being about 20% of all energy used electricity must move toward being the prime source, consequently the *rate* of increase of consumption is bound to be high over the next few decades.
 13. Even assuming considerable inter-settlement use of the car for passengers, its use (as an electrical mode) for freight seems unlikely. Freight movement by rail can be more economical than movement by small road units (4).

14. The role of 'government' will increase as:
 - (a) land use will have to be more closely controlled.
 - (b) settlement populations must be strictly limited.
 - (c) physical movement will need control.
 - (d) greater public investment in movement will be necessary as the public purse will have to carry a greater percentage of movement costs (at present the car owner pays capital and all maintenance and operating costs).
15. *Conclusions* This scenario suggests:
 - (a) The switch from oil to electricity as the main source of energy will probably mean a reduction in physical movement, unless a strictly local mode of generation can be found.
 - (b) This reduction in movement must at least be made good by the telecommunications and computer technology if the conditions of regions are to be maintained negentropic.
 - (c) The pattern of the spatosystem is energy and physical movement channels giving access to individual small settlements or clusters of settlements.
 - (d) Some variation in size of these settlements and clusters is possible according to the assumption made about individual transportation. Size will also be related to ecosystem and psychosystem limitations.
 - (e) The movement of freight between settlements can easily be by electric rail traction. The distribution in detail to households may be relatively difficult.
 - (f) Exurbanite development may be possible or not, according to which assumption is made about electric cars.
 - (g) Priority use of oil for agriculture.

3.3.2. Scenario: Assumption of Self-Determination of Local Groups (Decentralization of Decisions)

1. By the early 1970's the idea of the devolution of political power is well aired, and provincial and municipal governments make some show in this direction.
2. Devolution is assisted by local ratepayer groups who aim at modifying or reversing planning decisions based on municipal decisions (5).
3. The first stream of this scenario assumes these groups going no further in winning the power to make decisions. If this occurs, devolution could be regressive for the culture. The general level of performance of metros might fall first in regard to their capacity to cope with the urban equipment (housing, roads, piped services, public transit, etc.) and later in regard to the cultural level (knowledge, education, enjoyment, creation of psychofacts etc.) as groups become increasingly parochial.
4. In the circumstances of 3 vigorous use of the telecommunications technology could hold off the onset of entropy. The present potential of CATV for serving the local group as a forum is a move toward greater participation, but as at present organized CATV systems

are strictly limited in their territories, and are not interconnected. We may therefore see a disproportionate increase in strictly local political participation with a very serious falling off of regional consciousness. This could be very disruptive of the whole polity.

5. This arm of the scenario would appear to raise the dilemma of the present metropolitan cultures on the one hand breaking down into 'villages' and on the other merging toward the 'global village' (6). Both trends are present, not just one.
6. The second arm of the scenario hypothesizes that participation groups move successfully toward a much wider area of decision-making in which present 'political' decisions are merged with other components: production of ecofacts, machinofacts, sociofacts, and psychofacts. Thus the local group would be responsible to itself for a large part of its life. Some think that only in this way can it become a genuine living entity and individuals become self-actualizers.
7. If the local group is to guide itself in its dealings with the ecosystem (e.g. food production), its oversight of the socio-ecosystem (manufacturing, distribution of wealth, physical equipment including settlements, 'government'), and development of the psychosystem ('education', generation of psychic wealth, opportunities for self-realization, 'art', etc.), and if these things can serve best the individuals and groups by being decided at the strictly local level, *there arises the extremely important question of how local decision-making can be maintained in a reconciled condition with the perspectives visible only at regional, national, continental and planetary scales.*
8. It is here that the role of the telecommunications technology will become so important in making synergies of thinking possible in local, regional, continental and global contexts throughout the noosphere. The electronic technology can make possible the interchange and fusion of knowledge rapidly and continuously, conclusions being reached as a continuous process of ongoing decision-making. Without this highly developed use of the technology decisions in all spheres will run the risk of either being superimposed from above thus causing stultification of self-actualization (bringing destruction of motivation to act within the meaning of the common wealth) or entropic results arising from the local decision being not properly reconciled with requirements at other levels (e.g. a local area decides to make 'too many' motorcars, or use 'too much' steel).
9. Supposing that the knowledge-generation and info-system is adequately provided by the telecommunications technology, an important part of the scenario is to envisage the role of upper level (e.g. provincial government) decision-making. Its chief roles may well be information/knowledge dissemination and morale creation or myth-making (7).
10. The telecommunications top level infosystem of the synergetic development of knowledge will require very rapid development at once, there being very serious lags in this field at present (8). The

crucial role is the use of it to maintain the present assumed still negentropic condition of advanced cultures in the face of the serious threat of reversal which may be caused by decline in ecosystems, shortage of resources, devolution of political power, and rise in anomie. Harrison Brown, writing in the 1950's, thought strict control of man's thoughts and actions would be a corollary of our present behaviour. Now, our problem is perhaps seen as how to combine freedom of the individual with much more sophisticated control of the socio-ecosystem (9).

11. The role of creating morale or motivation, or myth-making is conceived as a perpetual circular process which may receive impetus at any level. It is not hierarchical. The stimulus to morale or the generation of myth may well originate in the small basic groups, to be given regional, continental or planetary formulation by groups working at those scales. The key idea is reciprocity of morale – or myth-making.
12. The role of the telecommunications technology in this area is interchange and synergy at all scales within each level. This is particularly necessary within the field of the socio-ecosystem since, if it gets out of hand, damage may result in the ecosystem and the psychosystem.
13. This scenario suggests that the present use of the CATV networks for expanded public participation may prove culturally entropic unless local groups can become extensively responsible for their own decisions. The telecommunications technology will become extremely important for the synergetic development and dissemination of essential guidance knowledge and for the building of motivation-generating myth. Only by vigorous development and use of the technology can the negentropic state be maintained. The scenario also brings out:
 - (a) implied major changes in the processes of production in their societal perspective.
 - (b) the emotional drive behind participation.
 - (c) implications of important relationships between the technological rationality on which our 'system' runs and the emotional support we can give it.

3.3.3. Scenario: Synergetic Brain Net

1. The rationale for this scenario is interaction between:
 - (a) Virtually our only model for public decision-making is that of the politicians as arbiters between the offerings of bodies of knowledge or pressure groups. Thus the politician will see the warnings of the environmentalists as only one among many views to be considered. This model is dangerous in a situation where irreversible damage may be threatened, or where great potential is present.
 - (b) We often possess better knowledge than we succeed in applying, particularly where the decisions lie in the public sector.

- (c) Any metropolitan region contains a considerable number of individuals expert in the various bodies of knowledge. At present they are not systematically in touch with each other. Consequently the potential of their synergetic thinking for societal matters is not developed.
 - (d) The electronic technology could overcome this isolation, but is not at present being consciously directed toward this end.
 - (e) A closely interacting net of such individuals could be a new voice in the public decision-making process.
2. The present condition will worsen as bodies of knowledge become ever more specialized and larger. Our actual handling of knowledge is declining because of these factors in spite of more sophisticated techniques. Many scholars are swamped by the knowledge explosion in their fields. Almost all become progressively uncertain of even basic ideas in fields outside their own.
3. Application of knowledge now very much depends on bringing together material from various disciplines. Our present disciplinary arrangements and even our interdisciplinary institutes are not notably successful at this either for knowledge-generation or societal application purposes.
4. An electronic network could be set up which would allow members of the Synergetic Brain Net:
- (a) each to disseminate ideas quickly.
 - (b) each to receive and 'hear' the ideas of the others immediately they are deposited (no use their being received if they are not looked at).
 - (c) to call for teleconferencing, say, up to 6 individuals on demand.
 - (d) to access stored material at any time.
 - (e) to penetrate to whatever reasonable depth in a subject may be desired, or obtain information how to.
 - (f) to classify material according to their personal needs.
5. Inputs by members of the net would be:
- (a) Ideas or information of likely relevance to others would be fed into the network through the member's terminal.
 - (b) Books read by members and thought important would be dealt with through a filtering technique:
 - (i) *first filter*: very brief statement of content and evaluation of why important
 - (ii) *second filter*: amplified statement of content and more detailed evaluation
 - (iii) *third filter*: full precis with detailed critique
 Not all books would reach the third filter. As all members presumably read, the audio recording of the material of these filters would be no great hardship.
6. The network would handle the inputs:
- (a) All ideas deposited during the day would be classified and the next day printed out at the terminals of all members.
 - (b) All books put into the system would have the first filter treated as (a) above.

- (c) At stated periods the network would print out to all members additions to the catalogue.
7. The member as a receiver would:
- (a) Look daily at his printouts, discarding those not interesting to him.
 - (b) Call for further filters of books.
 - (c) Allocate to his own filing system what he wishes to store according to his own purposes.
 - (d) Call for a teleconference.
8. The member might use the network strictly for his own purposes. For example, if he is writing a book and classifying material under his own headings the network will do this for him and give him retrieval capacity. Thus when reading for a certain purpose the member may deposit ideas into the system, some of these being for the other members and some only for himself. When required, his own material can be printed out as the net material. The special purpose material could be transferred if required, either to the net as a whole or to particular individuals of the net. Abstracts from many sources could be accessed through the network.
9. The network would depend on university computers and lines dedicated at least for certain hours of the 24-hour day. Ideally each member would have two sets of equipment: one in his working office and one in his home. The network would require management. Teleconferencing should permit operating in a common electronic space.
10. Both the net and the network would require adequate management, but care would be needed to avoid whoever manages either becoming 'politically' dominant.
11. Benefits derivable from the Brain Net include:
- (a) Leading brains in a region would know quickly what matters are uppermost in each other's thinking.
 - (b) Interchange would produce *synergetic* results both for the bodies of knowledge themselves and for application to social issues.
 - (c) A new force of top level opinion would be generated. Governments would have regard to such a body of opinion.
 - (d) Issues of major importance could be taken up by the net to 'work on' specifically, for the benefit of the community.
 - (e) All branches of knowledge would be stimulated.
 - (f) The individual members would increase their capacities.
 - (g) Wealth of a new type would be generated.
 - (h) Star creative personalities would be identified quickly.
 - (i) The universities would be stimulated to explore their contribution to the information age.

3.3.4. Scenario: Knowledge and Nurture

1. The basis of this scenario is that what we now call education is of diminishing reality in the emerging society and that therefore a new entity needs to be defined (10).

2. This new entity must not only function but it must be credible (11).
3. A most serious charge to be made against education at present is that it has largely eliminated the *responsibility for nurture*. In giving freedom of choice to the learner to develop according to his own wishes and in trying to avoid imprinting values we have so withdrawn as human beings from the learning individual that the *very elements of care and concern through which the personality grows and through which alone the opportunities of choice can be effectively grasped have been subtracted from the educational process. This grossly impairs it as a means of total personality development.* There results disintegration of the motivation to learn.
4. The new component must broadly include all types of knowledge of which the human being is capable: 'book', experiential, impersonal, personal, inductive, deductive, of the world, of the self.
5. As psychofacts will be the growth sector, knowledge will grow ever faster and be increasingly difficult to handle both for the individual and the agencies and equipment responsible for it.
6. This part of the scenario presupposes vastly improved equipment for storing, processing and retrieving knowledge over that which we have at present. Presently neither the book nor the bringing of the book to the reader is fast enough to keep up with the mounting flood of knowledge. Thus handling of knowledge becomes increasingly erratic for more and more individuals. Such pressures would appear to suggest responses:
 - (a) automation of present library systems.
 - (b) instantaneous interlinking of libraries.
 - (c) access to the polynucleated system from anywhere in the region.
 - (d) a sophisticated 'digest' service which boils material down to basic statements to give 'readers' opportunity to decide whether to pursue further or not, relate to this or that, etc.
 - (e) development of the use of other media.
7. This moves clearly in the direction of reconstituting the function 'library', since libraries at present transmit only certain kinds of knowledge and in certain established ways.
8. We should now take up the second part of the knowledge/nurture component. Nurture means care for the development of the individual as a whole. At present those who cannot adapt to our educational system become actually or potentially therapy recipients. The philosophy is to return them to 'normal' so that they can fit again into the system. The validity of this concept is seriously questionable, but it gives a lead in the field of nurture. It contains something that is therapeutic, namely *care* for the condition and development of the individual as human being.
9. Our experience with an education process which has to use remedial techniques to pick up the pieces suggests that the 'therapy' should be within the process. It must be incorporated as a positive and continuous concern for the emotional condition and development of the 'student'.

10. This implies that teachers (or 'facilitators') must be prepared to use their technical ability to encourage personality growth as a whole and not be satisfied with either transfer of information or exclusively the stimulation of the learner's cognitive abilities. Carl Rogers' view that basic reliance must be placed on non-directive teaching and the student's tendency toward self-actualization must receive much greater emphasis, as might Dewey's concept of education as the reconstruction of experience.
11. Nurture implies discrimination between various values. It does not mean, as is now generally supposed, the honouring of a single value only, such as that of leaving the learner to choose largely what he likes. Nurture implies the continuous affirmation that some values are better than others (12).
12. Values cannot be safely left to the vagaries of the present knowledge transmission process. The transfer of knowledge and the transmission of values are inseparable.
13. Very interesting in *Teg's 1994* is the idea that myth generation is necessary. Theobald makes Ben observe that the myth of decentralization needs to be supported by the creation of a myth 'of joint terran synergy' (13). Myths of this kind are values; their generation and transmission to emerging individuals is nurture. Vigorous attention to values through the electronic media will be a method of counteracting the culturally entropic tendencies inherent in decentralization.
14. A present serious difficulty with education is the gap in leading edge knowledge between the front thinkers and students in schools. It is necessary that this gap be reduced by keeping the top level synergies and the more routine knowledge/nurture process within the same electronic universe. Schools, etc. should therefore be able to tap freely into the network which serves the Brain Net (14).
15. The responsibility placed on the telecommunications and computer technology will include assistance in the production of new knowledge, storage and retrieval, dissemination and assuring that knowledge reaches individuals and groups who should receive it. Present foreseeable 'needs' are no measure of likely loads because information nets of this kind, like expressways, will generate their own uses, which quickly become 'needs'. Examples of incipient such networks are the CANUNET (trans-Canada linking of universities) and METANET (linking of Ontario universities for data accessing and processing (Fig. 7).
16. The transfer of 'factual' knowledge by telecommunication techniques will probably proceed fast. As populations of metros decentralize they must be used increasingly to maintain contact between learner and facilitator since decentralization must include the physical decentralization of our multiversities. The techniques for coping with this are already emergent.
17. The nurture aspect of the function, however, is a wholly different matter. At present the nurture aspect of material on the media is largely negative, possibly destructive of values which are urgently

necessary to our survival. *Most urgently required is study on how the technology can be put to use on the nurture part of the knowledge/nurture function.*

18. The development of the aesthetic sense is one area where this could be done. Another is the enlargement of the use of the equipment for interaction between individuals and groups. The compulsory requirement of the Canadian Radio and TV Commission that cable companies must maintain a studio and channel for local use is promising in this direction. Some kind of grassroots influence over media programs will be necessary.
19. For requirements in this scenario multinode electronic networks would seem superior to single node serving large areas or populations because the multinode has diversity and morale-building value at the local level while not in any way detracting from the drive of the network as a whole toward a condition of cultural negentropy.
20. This scenario suggests:
 - (a) Although for strict technical purposes knowledge may be transferred neutrally, 'education' cannot avoid the values question. The development of the individual implies 'teaching' values as much as facts. Knowledge is therefore inseparable from nurture. It is not sufficient to 'educate' the cognitive faculties only.
 - (b) The knowledge/nurture function must be incorporated with top level synergetic thinking crucial to assist in maintaining a decentralized society in a negentropic condition. The present unidirectional media systems favour centralization.
 - (c) The synergetic and knowledge/nurture functions should serve all levels of society and all age groups equally and there should be equal opportunities for contributing.
 - (d) The design of the special networks, their management and detailed equipment must be done with these requirements in mind. Substance in societal terms cannot be left to the haphazard development of the technology.
 - (e) Global synergetic activity will be increasingly necessary. The telecommunications and computer technology will have to facilitate this as quickly as possible (15).

3.3.5. Scenario: Stabilization

1. The intention of the drive toward stabilization is to ensure that man's activity stays within the capacity of the biosphere to sustain human life at acceptable levels. This means first that the limits of ecosystems must be respected and second that non-renewable resources which are in failing supply must be husbanded. The two are connected since renewable resources in some measure will have to substitute for non-renewable and because socio-ecosystems are components of ecosystems.
2. Moving toward stabilization of ecosystems for many regions will mean stabilization of population numbers. Some idea of the acceptable human carrying capacity of a region will have to be determined.

For this there are no absolute criteria. Nor are there any general criteria which can easily be adapted. Tax and other societal inducements may be necessary to keep the population stable.

3. Population stabilization is perhaps at present capable of being approached through considering the sizes of settlements. Metropolitan areas become much more expensive in energy, health services, crime control, education, transportation etc. as they get bigger. They are much more manageable at one than five million.
4. If the metropolitan area is to be brought more within the ecological stability context it must be limited in physical growth. Population distribution is therefore an ecological consideration requiring, in general, a more wide distribution of regional populations than is presently the case in many city-based regions. Hence policies of decentralization may be applied.
5. Some order of ratios between population and total land surface used for the production of renewable resources (e.g. food, trees, etc.) needs to be established as a guidance program for regions (16). In a region with one million population measuring 100×100 miles distribution in settlements of 5,000 would give a distance of about 6 miles apart for 200 settlements, each having 50 sq. miles, or 100 persons per square mile.
6. Another set of measures would be found in the degrees of air, water and land pollution. On the positive side the measures of complexity and diversity of species in the regional ecosystem would be important indicators of its stability. If pollution were found to be increasing and complexity and diversity were diminishing these would be vital evidence of a declining condition needing arrest and reversal at some stage. Inducements will be required to enhance complexity and diversity.
7. Stabilization of the ecosystem would imply a much more balanced relationship between the settlement areas and the non-urban areas. This means that land use control will have to be treated much more seriously than at present, individual uses being carefully planned to play their roles in the total ecology. A genuine symbiosis between the two elements – urban and non-urban – has to replace the present exploitation of the country by the city. This will require major changes in ‘government’.
8. Recycling of the nutrients in settlement wastes into the ecosystem will be required. Sewerage systems will need redesigning to achieve this. Controls will be necessary over persistent pesticides and fertilizers and eventually their use will be discontinued. Inducements and prohibitions will be necessary to bring this about.
9. Attempts to move toward more stable and more diverse ecological conditions will demand a sophisticated system of continuous monitoring of the physical condition of the region. Monitoring at present rarely goes beyond very crude samplings of air and water, and some information-gathering about agriculture. *A region needs a biological monitoring service. A telecommunication/computer facility would easily provide the technological capacity required.*

Much monitoring could be automated, supplying information when required in suitable forms for decision-making about land uses, air quality control, etc.

10. The move toward stabilizing the socio-ecosystem is best stated in specifics. It implies a much greater regard for the preservation and conservation of non-renewable resources than at present. This means a reduction in waste. Goods will need to be made for longer life. This may be introduced by durability taxation (tax is reduced as life of the commodity lengthens) and tax on the use of new resource material (17).
11. This idea will alter the whole 'economy' so that the aim will be to use as little new material as possible, and to move it round the system as slowly as possible, thereby saving energy as well as materials.
12. Renewable resources industries will need encouragement by preferential taxation and pricing.
13. An effect of greater durability of goods will be that fewer jobs will be needed to maintain the stock than the present flow. *This will give further impetus to rethink how society is to produce and distribute the right to consume the goods and services produced.*
14. The sequence of linkages will need to be: Decisions about what and how much to produce – Production – Distribution – Use – Recycle – Observe effects – Feedback to decisions. The control process at present is largely a matter of entrepreneurial initiative and the market with some intervention by government. It must become much more a societal process geared to social ends by visible and open techniques in which there is widespread participation.
15. In these conditions a substitute for the present risk activity of business will have to be found if the benefits of constant innovation are to be maintained. To do this the society might give special rewards for innovation which saves material or energy or gives longer life for the goods produced.
16. Stabilization in the ecosystem and in the capital equipment (goods) of the region should not be construed as autarky. Regions will still be interdependent since natural advantages or disadvantages exist. Theobald in *Teg's 1994* recognizes that some will be abundance regions and some will not, for a long time to come (18). This implies national and planetary attention to the inter-relationships of territorial units.
17. Production – consumption stabilization implies an information system of great sensitivity linked with a continuous processing system capable of producing a flow of indicators showing the total state of the socio-ecosystem. This is an indicator system which would serve both what is now 'government' and 'business', the two merging into a new function – control. The electronic technology will be required to provide the technical networks for handling this level of core socio-economic knowledge/decision function. At present the linkages between the decision-making of government and those of business are erratic and intermittent in their operation, not to

mention having only slight reference to the need for such decisions to be social in orientation.

18. The direction of stabilization in the ecosystem and the socio-econsystem will allow, but not guarantee, ample growth in the psychosystem. The growth area of the society will be in the development of human personality and group activity. The relevance to this scenario is that the levels of stabilization aimed for must be high enough to offer the possibility of self-actualization to a large percentage of the population. There is therefore a dynamic relationship between stabilization in the physical and economic sense and growth in the psychic sense.
19. This scenario has suggested:
 - (a) A drive toward stabilization at high levels of complexity and diversity in regional ecosystems.
 - (b) This will need a better symbiosis between urban and non-urban elements. Inducements will be required to redress the present imbalance.
 - (c) Autarky is not the aim but the symbiosis of regions could be maintained, some providing more than their own food, others less.
 - (d) Moving toward stabilization in the socio-economy means stabilization of the 'capital' of the region. It implies a linkage: societal decision – production – distribution – use – recycle – review – feedback to decision.
 - (e) It implies the acceptance of conservation of material, including recycling and concern for economy of energy used.
 - (f) In order to move toward stabilization inducements and discouragements will have to be instituted.
 - (g) The telecommunications and computer technology will be required to monitor both the ecosystem and the socio-econsystem, provide indicators of the status of these systems on a continuous basis, and make available information in effective forms for decision-making that will guide the ongoing processes.
 - (h) The professionals will be ecologist-socio-economists.
 - (i) The stabilization of ecosystems and socio-econsystems does not imply stabilization in the psychosystem.

3.3.6. Scenario: Organizational Nets and Electronic Networks

1. The literature does not clearly distinguish between the societal organization *net* required for performing a function, like knowledge-nurture, and the technical *network* of wires, channels, etc. needed to carry the material. In general, the approach has usually been to apply the technical equipment to the present functional or institutional arrangements, or to show how the present arrangements of the technology could be expanded to serve the existing, or expanded functions. Thus, Goldmark lists five technical networks for 'the new rural community': (1) connects every terminal with every other (at present represented by the telephone), (2) AM-FM radio and TV

broadcasting, (3) broadband cables giving some callback, local participation, general information for citizens, (4) 30 two-way TV channels connecting major public institutions, (5) municipal emergency service. In addition there will be external networks connecting communities: (1) broadband or microwave, (2) long-distance broadband circuits, (3) common carrier broadband and narrow band services, (4) incoming educational cultural, recreational etc., activities (19).

2. It has not been adequately appreciated that:
 - (a) the institutions are already undergoing rapid change, e.g. 'education', 'government', 'family', 'work' are becoming difficult to define.
 - (b) the question of the *control* of the organizational net will influence the technical network design, and vice-versa.
3. This scenario attempts to develop from the worldview through the regional directions and the key new 'institutions' some idea of the organizational requirements of communication and to relate these to possible technological networks. This is irrespective of what electronic networks are already existing and entrenched in our society. The chain of reasoning is therefore: worldview – regional directions – key new institutional areas – organizational nets required – technological network patterns.
4. The organizational nets will require subnets for (a) offering advice, (b) exchanging information. *The nets are therefore major control elements in the society and the subnets are their subsidiaries. Control does not imply hierarchy; it rather means focus of influence.* The advice and link nets would use telecommunications extensively but also other means of communication. The major nets are conceived as very heavily dependent on sophisticated electronic telecommunications.
5. The following table gives the major nets and their subsidiaries for organizational purposes.

SOCIETAL ORGANIZATIONAL NETS

<i>Major Nets</i>	<i>Subnets</i>
<p><i>Synergetic Brain Net</i></p> <p>Creation and collection of top level knowledge. Dissemination of it to top level individuals and downwards. Advice to decision-makers. Feeding Knowledge-Nurture Net. Instantaneous interaction for top level brains.</p>	<p>Advice net to: Societal Decision Net.</p> <p>Link nets to: Knowledge-Nurture Net, Ecol-Soc-Econ Monitor Net, Psychosystem Net, Nets of other regions, nation, and planetary contacts.</p>
<p><i>Knowledge-Nurture Net</i></p> <p>Acceptance, storage, processing and retrieval of knowledge. Learning systems for all age groups in all types of knowledge.</p>	<p>Advice net to: Psychosystem Net, Synergetic Brain Net.</p> <p>Link nets to: Societal Decision Net, Ecol-Soc-Econ Monitor Net, Operational Net, Nets of other regions, nations, and planetary contacts</p>

Psychosystem Net

Generation of psychic wealth. Facilitate self-actualization of individual. Generation and handling of myths. The arts.

Advice nets to: Synergetic Brain Net, Societal Decision Net.

Link nets to: Knowledge-Nurture Net, Nets of other regions, nations, and planetary contacts.

Societal Decision Net

Making decisions in the ecosystem and the socio-econsystem at all levels from local to regional national, international and planetary. Generating awareness that decisions required.

Advice nets to: Synergetic Brain Net, Knowledge-Nurture Net, Psychosystem Net, Ecol-Soc-Econ Monitor Net.

Advice nets to: Operational Net, Nets of other regions, nation, and planetary contacts.

Ecol-Soc-Econ Monitor Net

Provision of continuous flow of information at all levels about the status of the ecosystem and the socio-econsystem.

Advice nets to: Synergetic Brain Net, Societal Decision Net, Operational Net, Nets of other regions, nation.

Link net to: Knowledge-Nurture Net.

Operations Net

Carrying decisions into effect. Maintaining equipment. All routine, mechanical and other services. Includes 'government' maintenance of regional equipment, supply of food, goods and services.

Advice nets to: Societal Decisions Net, Ecol-Soc-Econ Monitor Net.

Link nets to: Synergetic Brain Net, Knowledge-Nurture Net.

6. From this analysis of organizational nets and subnets required for a new institutional arrangement of society we may pass to relating these nets to the technical networks either required or available, bearing in mind the necessity for decentralization and more even spread of populations over greater metropolitan regions.

TELECOMMUNICATIONS NETWORKS REQUIRED FOR ORGANIZATIONAL NETS

For Synergetic Brain Net

A dedicated multinode full two-way network linking universities and research establishments. Each establishment is a major node with its own computing ability, to ensure diversity. Individuals on the Brain Net must have very easy access as a feature of both working and private life. Easy teleconferencing in a common electronic space for up to any 6 individuals is desirable. Each member must have full audio, video, storage, retrieval, and printout facilities. Part of the

technical business of the network will be to manage the 'filter' service of ideas and comments on them (Fig. 2).

For Knowledge-Nurture Net and Psychosystem Net

A multinode network in the sense that many nodes do their own organizing and processing, linking 'libraries', other storage and diffusing agencies, and learning systems with common access by the public at large. It must be interconnected easily with the public radio and TV diffusion networks, and the person-to-person modes. This network must penetrate into all buildings and even all rooms, and be accessible 24 hours a day at cheap rates. It includes general diffusion and various levels of two-way operation (Fig. 3).

For Societal Decision Net

Three types of network flow are required: (a) at the local level between individuals and groups, (b) at region-wide level between groups, (c) a blanket coverage of all individuals from some level of centralization. Regional and national level information must reach the local public. This can be by general diffusion. Decisions at regional level require transmission to local focal points for putting into effect. Local decisions have to be arrived at by local interaction, transmitted to the regional centre and interacted with other local groups to arrive at regional decisions. At the local level (a) there would be individual home access. Level (b) would use a dedicated network both to local group centres and outwards to other regions and national centre (Fig. 4).

For Ecol-Soc-Econ Monitor Net

Characteristic of this type of network is a hierarchy of nodes. Information must be collected at local level, moved upward into larger aggregates, processed into forms useful for various agencies, and made capable of access by various levels, including the local. This suggests a dedicated network down to the local point, where information is collected, through an intermediate collating centre to a central regional centre. Access would be readily available to the public via this hierarchy of centres using non-dedicated nodes such as the telephone or cable network (Fig. 5).

For Operations Net

The operations of running a region will also imply a hierarchical ordering of the communications networks. Production will require local, regional and national access to information which may or may not be hierarchically ordered in its accessing. For workers who communicate instead of commute local centres with a high level of equipment may be necessary. A good deal of dedicated network facility may be required; at the same time much may be done through the common channels entering every building. Certain operations, such

- as law-enforcement, emergencies and medical services will need dedicated lines. In general two-way operation is essential. Information about services will have to have common access. Some two-way very small scale interaction will have to be accommodated for interaction between local groups and the agency charged with an operational activity such as detailed change in land use (Fig. 6).
7. We should not assume that extensions or elaborations of our present electronic networks are necessarily the best way to proceed. Such elaborations will take place under the normal pressures for development. The danger is that the results of these pressures may not necessarily produce networks most suitable for a rapidly changing cultural condition, but may jeopardize desirable lines of development.
 8. At this stage no attempt is made to reconcile the theoretical electronic networks outlined above with those already in existence. To do so is a more complex task than is superficially obvious.
 9. Both nets and networks will require management groups concerned with both policy and operations, the debate on where these are to be located in the social framework is already with us.

- (1) The most highly developed relevant systems approach is in ecology. Systemic theorists in planning generally find difficulty in using systemic concepts both descriptively and for action (prescriptively).
- (2) Even present population distributions may be culturally negentropic largely because of the telecommunications' (especially the telephone) role.
- (3) I am indebted to Dr. G.R. Slement for assistance here.
- (4) Taking into account costs to both public and private sector.
- (5) For statement of levels of identity see Butt, D.S. "The Psychological Environment of the Village; Obsolete or Essential?" in *Citizen and City in the Year 2000*, 115–122. The levels suggested are: personal-familial, village-communal, political-cultural.
- (6) Marshall McLuhan has popularized this idea.
- (7) Myth needs rethinking as an object of conscious creation. It need not mean manipulation but could be acceptably generated by interaction between various identification levels in the society.
- (8) See scenarios Knowledge/Nurture and Synergetic Brain Net for interlocking.
- (9) *The Challenge of Man's Future*, 218–219.
- (10) Illich in *Deschooling Society* is relevant, 75 et seq. For critique of Illich see Gintis, "Towards a Political Economy of Education".
- (11) For changes in function see Dakin, *Telecommunications in the Urban and Regional Planning Process*, 3.3.
- (12) McHale points out that science is now as important a value-affirmer as government, church, school, family. See *The Ecological Context*, 26.
- (13) Theobald, *Teg's 1994*, 128.
- (14) See Mitchell, H.E. "Preparing Youth for a More Integrated Urban Community", in *The Citizen and the City for the Year 2000*, 173–178.
- (15) An example of moving to the global scale is a researcher in Cambridge, England, using a computer in Don Mills, Ontario.

- (16) At present the US has about 350 persons per square mile of arable and cropland.
- (17) See *A Blueprint for Survival*, 39.
- (18) See *Teg's 1994*, 53.
- (19) Condensed from: Goldmark, "Tomorrow We Will Communicate to our Jobs". For diagrams of typical networks see: National Academy of Engineering, *Communications Techniques for Urban Improvement*, Washington: Dept. of Housing and Urban Development, 1971; or Dakin, *Telecommunications in the Urban and Regional Planning Process*, Figs. 2-4, 6-9.

CHAPTER FOUR

EXPERIMENTS AND SIMULATIONS ON THE WIRED CITY FACILITY

4.1.1. Introduction and Headings of Exercises

This chapter and the next contain suggestions for ways in which practical knowledge of developing uses of the technology can be obtained within the context of cultural change. The exercises have been generated within the constraints of: the technical equipment of the Wired City facility, personnel likely to be available, priority of need for new knowledge, and present operational conditions in functioning aspects of our society (e.g. how to solve certain problems of planning operations in the Toronto-Centred Region). The exercises are briefly listed (items in parentheses refer to the organizational nets, etc. of previous chapters):

Exercise 1

PURPOSE OF EXERCISE: To obtain experience of how interaction on the Wired City facility network between a chief metropolitan planner and the planners of the constituent boroughs could substitute face-to-face meetings and might facilitate the planning process by making conferencing possible where it is now rarely used because of time constraints. (Societal Decision Net, Operational Net; Socio-ecosystem, Spatiosystem). Metropolitan Toronto Planning Commissioner and Chief Research Officer; the planning directors of the six Toronto Boroughs.

Exercise 2

PURPOSE OF EXERCISE: To investigate (a) the degree to which teleconferencing between the centre of a major regional planning operation and the sub-regional planning offices could enhance the efficiency of the planning operation by reconciling the necessities of centralization and decentralization of authority, and (b) the likely effectiveness of the telecommunications/computer facility for providing a common information system for the planning process of a greater metropolitan region. (Societal Decision Net, Operational Net; Popusystem, Ecosystem, Socio-ecosystem, Spatiosystem). Central planning office of the Toronto-Centred Region; the planning offices of the Regional Municipality of York, the Central Ontario Planning Area, and the Kitchener-Waterloo Planning Area.

Exercise 3

PURPOSE OF EXERCISE: To obtain experience of several groups working on the network of the Wired City facility in arriving at key conclusions about the physical pattern of the Ottawa region in 2000 A.D. (Synergetic Brain Net, Societal Decision Net; all Systems). Planners of the Ottawa-Carleton Region, planning practitioners in Ottawa, students and staff of Universities in Ottawa.

Exercise 4

PURPOSE OF EXERCISE: To find out how to use teleconferencing between departments of a provincial government in terms of the urban

and regional planning process, with particular reference to improving the speed and quality of decision-making, and the practicality of developing an early warning system. (Societal Decision Net, Ecol-Soc-Econ Monitor Net, Operational Net; all Systems). The following divisions of the Government of Ontario: Regional Development Branch (Toronto-Centred Region Planning); Municipal Services Division; Dept. of the Environment; Dept. of Transport and Communications; Dept. of Natural Resources.

Exercise 5

PURPOSE OF EXERCISE: To test the network for general participation in the urban and regional planning process. To test teleconferencing for improving the contribution of public participation, including the possible linkage of teleconferencing with CATV capabilities. (Societal Decision Net, Operational Net; Socio-ecosystem, Spatiosystem, Infosystem). The City of Ottawa planners and members of four public participation groups in the Ottawa area.

Exercise 6

PURPOSE OF EXERCISE: To test the usefulness of the network for carrying out the detailed design of a micro urban area where the design participants are separated by considerable distances, particularly in regard to the inputs to the design process made by various agencies of government. The aims also include speeding up the reaching of the final design and improving the quality of the design. (Societal Decision Net, Operational Net; all Systems). Planning offices of the Ottawa-Carleton Region and the City of Ottawa; City of Ottawa Transportation Dept.; a developer.

Exercise 7

PURPOSE OF EXERCISE: To test the ability of the system of interconnected terminals to handle planning information, including the compaction of the material handled. (Ecol-Soc-Econ Monitor Net, Operational Net; Infosystem). The planning staff of the Toronto-Centred Region; the planning staff of Richmond Hill, Vaughan Township, Markham Township, and the Regional Municipality of York.

Exercise 8

PURPOSE OF EXERCISE: The synergetic use of brain power in the Urban and Regional Planning Schools across Canada to test the capacity of the network (a) for improving the quality of planning education and (b) for producing synergetically generated results for raising our level of knowledge about cities and regions and how to act upon them. (Synergetic Brain Net, Knowledge-Nurture Net; all Systems). The planning schools of the following universities: McGill, Toronto, Ottawa, Waterloo (or Manitoba), British Columbia.

Exercise 9

PURPOSE OF EXERCISE: To test the network for its capacity for allowing synergetic exploration of the institutional aspects of futures, and to obtain key ideas about the future institutions which will emerge as a result of telecommunications/computer technology interacting with existing institutions and emerging elements of cultural, social, economic

and political change. (Synergetic Brain Net, Knowledge-Nurture and Psychosystem Net; all Systems). Ten selected brains.

Exercise 10

PURPOSE OF EXERCISE: To attempt the establishment of basic environmental design criteria for the Greater Metropolitan Region of Southern Ontario. The essential elements of the ecology-resources context for planning will be established through correspondence by the participants. On the network they will search for applications and guidelines for the region. (Synergetic Brain Net, Societal Decision Net, Ecol-Soc-Econ Monitor Net; all Systems). Ten selected brains.

The above exercises are suggested for running experimentally on the Wired City facility, or laboratory, being set up in Carleton University, Ottawa, under the direction of Dr. D. C. Coll. This facility is described in *The Wired Scientific City*.

4.1.2. The Exercises as Controlled Experiments for Scientific Purposes

The chief difficulty is that in order to gain firm knowledge we need so to control the experiments and simulations that they are repeatable and, hopefully, consistent in their results when repeated. The degree of control necessary to achieve this standard would, however, be likely to be so heavy as to rule out the creative use of the equipment to a very large, and wholly unacceptable, extent. The first attempts at this kind of exercise for urban and regional planning purposes should therefore not be too heavily controlled as it is precisely the new and creative uses on which we most urgently require knowledge.

Leonard in *Teleconference Canada Research Plan* emphasizes this idea: "Developing an awareness of these unique characteristics seems more likely to occur by consciously searching for novel stable patterns than by imposing a fixed set of patterns that define the possibilities by the experimenter's preconception" (p.34). After some initial results have emerged controlled laboratory experiments can be designated. Close control of experiments using real world actors is therefore at this stage not considered very practical but should be considered as a subsequent stage.

The following observations are relevant to this question:

1. An exercise may be placed anywhere on a continuum ranging from complete freedom for the actors, to precise prescription of what they must do.
2. Where complete actor freedom is given scientifically gathered information should be obtained through the monitoring.
3. Some control of the exercise could be expected where the answer to a specific question is required.
4. Monitoring could usefully be divided into (a) technical (i.e. in the substantive area such as urban planning – what is the planning evaluation of the exercise?), (b) psycho-environmental (i.e. behavioural monitoring irrespective of substantive area).
5. Design type exercises are capable of some control since the goal is to produce a design from available materials. Problems will occur,

however, when there is a very large number of variables. In some measure this process is the use of problem-solving techniques using the equipment. So a key experimental area may be: how are problem-solving techniques to be applied with the equipment, and, how can the equipment be used in problem-solving? (Not all planning matters are amenable to 'problem-solving'.)

6. The planning uses of the equipment identifiable to date basically are: (a) teleconferencing, (b) data-handling, (c) design process, (d) urban and regional control systems (e.g. physical traffic, law-enforcement) but there is considerable lack of clarity, making experiment difficult, in the following:
 - (a) the applications in the urban and regional planning process *as at present practised*,
 - (b) the applications to the life processes of the region (telemedicine, tele-education, law-enforcement, etc.),
 - (c) the new patterns of physical arrangements of settlements, physical communications and other land uses, and the human and freight movements across the region,
 - (d) urban/region control systems would seem to be separable from other applications such as tele-education, but telemedicine, on the other hand, is partly a control system since it would be responsible for dealing with epidemics and mass-immunization.
7. There are several areas visible in which knowledge needs to be gained and in which evaluation will be necessary:
 - (a) The area of the discipline in which experiment takes place, i.e. what information can we get about quality of performance in the substantive material? Thus in the exercise involving the Metro Toronto planning commissioner and the directors of the six boroughs we would expect to get some assessment of the effectiveness of teleconference compared with that of face-to-face meetings on the same subject.
 - (b) The fact that the electronic mode may be less effective than the face-to-face does not rule out its use because the saving on physical movement of the participants has to be set against any loss of effectiveness. We therefore need comparative information about the two modes.
 - (c) How much do the backgrounds of the actors affect performance? How are skill in conferencing, rapidity of learning new techniques, temperament, etc. to be measured?
 - (d) The behavioural effects exhibited by the actors.
 - (e) The facts of the environment. What precisely is to be counted as the environment of the actors? A major division may be:
 - (i) interface between human beings live through the equipment
 - (ii) interface between human actor and the machine
 - (f) Environment would include at least: (i) the physical space in which the actor is placed, e.g. the 'studio' at each node, (ii) the electronic visual space presented to the actor on the screens,

- (iii) the audio space, (iv) the ‘atmosphere’ of the substance of the experiment, (v) the ‘cultural’ background of the actors, i.e. the intellectual etc. ambience which they bring to the exercise from their everyday work.
- 8. Exercises which focus on the handling of data (as in telemedicine, or credit and banking) will be easier to set up on a controlled basis than those which depend on teleconferencing to arrive at decisions.
- 9. The insight of the previous chapters that our society is moving toward reformulation of its institutions and new foci of power makes the control of exercises the more difficult. For example, tele-education is seen to be a likely wrong approach since it implies not a reformulation, like knowledge-nurture, but the electronification of the present activity called education.
- 10. The conclusions from these observations are:
 - (a) The first round of exercises should emphasize freedom of the actors to develop the uses of the equipment as working with it suggests.
 - (b) Control for scientific purposes in (a) should be confined to (i) technical and (ii) psycho-environmental monitoring.
 - (c) Greater control should be attempted in later exercises when some knowledge has been gained and evaluated.
 - (d) Some degree of control may be possible in framing exercises in design and where the handling of data plays a major part.
 - (e) The important element at this stage is to find out how to use the new possibilities creatively and synergetically.

4.2. Exercise No. 1: Metropolitan Planning Director Interacting with Planning Directors of Constituent Boroughs

Preamble

Discussions with the Metropolitan Toronto Planning Commissioner indicate that metropolitan planning could greatly benefit from the ability of the planning directors to communicate through a teleconferencing process. Such ability would appear useful whatever the type of organization of metropolitan planning. For Metropolitan Toronto the organization is:

- (1) The Metropolitan Toronto planning office responsible for the Metro Toronto plan covering: (a) general land uses, (b) ways of communication, (c) sanitation, (d) green belts and park areas, (e) public transportation.
- (2) Six Borough planning offices: City of Toronto, Etobicoke, York, North York, East York, Scarborough. These are responsible for the detailed planning of their areas within the general framework provided by the Metro Plan.
- (3) The planning offices of the 7 ‘fringe’ municipalities. These municipalities are in what remains of the original ‘fringe’ planning area of Metropolitan Toronto. These also are responsible for the planning of their municipalities within the framework of the Metro Plan.

All jurisdictions are regarded as having viable Official Plans in operation in accordance with the provisions of the Ontario Planning Act as amended.

Purpose

In a two tier system of government the planning process involves a plurality of planning responsibility. This results in several planning offices each led by a planning director. Conferences between the directors of the two levels are necessary but difficult because of distances between offices, scheduling of meetings, etc. The purpose of this exercise is to explore the use of common electronic space to facilitate the planning process by making conferencing easier and more frequent.

Participants

Assuming that the network of the Wired City facility will not initially be electronically extendable to Toronto it will be necessary for the personnel concerned to visit Ottawa. As there are five network nodes and seven actors, doubling up will be necessary. The two smaller boroughs (York and East York) could double with Etobicoke and Scarborough respectively. The exercise will be *experiment* with real-role actors in real time but *simulation* in that the locale will not be the actual offices of the directors. Directors may be supported by staffs. The Metro Toronto Planning Commissioner, and the Planning Directors of Etobicoke, York, North York, East York, Scarborough, City of Toronto. Participants will be required to report their findings.

Substance

This cannot be detailed at present. Items may be selected from the following functions of the planning process:

- | | |
|-------------------------|-------------------------------------|
| 1. Examine assumptions | 12. Research |
| 2. Develop goals | 13. Think tanks |
| 3. Obtain data | 14. Simulation |
| 4. Process data | 15. Futures |
| 5. Generate plans | 16. Coordination |
| 6. Evaluate plans | 17. Political decision-making links |
| 7. Select plan | 18. Technology |
| 8. Implement plan | 19. Management of process |
| 9. Public participation | 20. Special studies (e.g. impacts) |
| 10. Day-to-day control | 21. Self-education of planners |
| 11. Critical paths | 22. Evaluate process. |

Briefing of Participants

Briefing before the running of the exercise in Ottawa will be done in Toronto (Dept. of Urban and Regional Planning, University of Toronto). It will consist of:

- (a) Written explanatory material.
- (b) Discussion on (a) to clear questions.
- (c) Display of terminal equipment.
- (d) Practice in the use of the terminal equipment.
- (e) Instruction in network discipline.
- (f) Written material on *some* of the planning substance to be used.

This material will be circulated before the briefing. Some substance will be unprepared.

- (g) Written guidance on self-monitoring for the directors.
- (h) Instructions on reporting.

Briefing of Technical Monitors

Two technical (planning) monitors will be required to attend the exercise as observers to report on its effectiveness as a technique in the planning process, particularly:

- (a) Difficulties of comprehension or conveying meaning.
- (b) Control of flow of discussion.
- (c) Possibilities shown for improvement in communication between offices.
- (d) Types of substance showing high or low adaptability to the technique.
- (e) The quality of decision-making as process and product.

Monitors will receive instructions on how to report so that some degree of comparability between exercises may be achieved. It is desirable that monitors act through several exercises to obtain cumulative benefits.

Briefing of Behavioural Monitors

Two monitors will be required to monitor the behaviour of the participants, and report particularly:

- (a) How the participants use the equipment.
- (b) How the equipment influences their behaviour.
- (c) Participants' responses to the physical environment.
- (d) Relationship between equipment and variables of personality.
- (e) Degree of responsibility achieved in discussion and decision-making.

Monitors will receive instructions on how to report, and should act through several exercises.

Duration of Exercise

Three days of continuous interaction. This period will be punctuated by face-to-face discussions of problems being generated. Critique of these discussions by the monitors will be required.

Study Group

On completion of the three days a specially composed study group will examine the results. This group will include representation from the planners participating, the monitors, the Wired City facility committee, the WCF management group and the researchers originating the exercise. The group will report its conclusions.

If the report of the study group warrants it, the exercise could be resumed incorporating improvements for another two or three days.

Exercise Manager

The manager will be responsible for organizing the exercise in accordance with the program. He should be familiar with the planning field.

Principal Researcher

He will be responsible for providing the manager with the details

not specified in the program concerning such matters as the substance to be run and the reports of the monitors. He will also act as general adviser to the exercise. He will receive and collate the various reports and relate the material from the other exercises.

4.3. Exercise No. 2: Decentralization of Planning of the Toronto-Centred Region

Preamble

The present necessities for administering the planning of the 8,000 square mile Toronto-Centred Region include a clustering of staff and a concentration of decision-making in the vicinity of the Ontario Government centre in Toronto. The reason for this is the constant need for face-to-face consultation and committee work. A serious objection to this situation is that the officials responsible for the various parts of the region (e.g. the Hamilton or Oshawa areas) if situated in their areas are not easily available for face-to-face discussion in Toronto, or, if located in Toronto, are not sufficiently in day-to-day contact with their areas. A solution would be to locate the local staffs in their areas and link to the centre through teleconferencing and a shared information system.

Purpose

To test the degree to which:

- (a) teleconferencing could substitute for face-to-face meetings at the centre of the Toronto-Centred Region planning operation.
- (b) telecommunications/computer facilities could act as a common information system for the central and decentralized planning offices through the region.

Participants

The nodes of the network could be manned by the planning directors of:

1. Toronto-Centred region, Regional Development Branch, Government of Ontario.
2. Regional Municipality of Hamilton-Wentworth.
3. Regional Municipality of York.
4. Central Ontario Joint Planning Board.
5. Waterloo County Area Planning Board.

These offices are so geographically placed that they give a fairly good 'net' coverage of the region. The exercise would give real-role actors handling real material but in simulated location. It would be desirable for the principals of the various offices to be the chief participants to achieve maximum value for the individual offices. Each principal would need the backup of at least one staff member. It is possible that one non-professional person (politician or member of planning board) might also be on each node. The danger is of ending up with a group of panels which descend into chitchat. The staff members might very well be responsible for purpose (b) while the principals concentrate on (a).

Substance

Purpose (a): Topics for teleconferences might be in any of these classes:

1. Urbanization pattern
 - a. land uses
 - b. transportation and telecommunications
 - c. cultural changes
2. Intergovernmental questions of principle.
3. General questions of implementation.
4. Ecological policies.
5. Administrative matters of the planning organization.

Purpose (a) needs no special methods but could usefully be arranged in sequence with direct face-to-face meeting in order to explore the effectiveness of a sequence of meetings comprising both teleconferencing and direct face-to-face.

Purpose (b): Material to be called for should not be routine or purely local but effort should concentrate on material which may be generically useful to various parts of the region, or alternatively to the centre:

1. Economic, social and political facts of the areas.
2. Trends.
3. Facts relating to implementation, particularly facts difficult to negotiate.
4. Findings of specific area reports.

Purpose (b) would require that the WCF for this exercise would need linking up to stored information available about the various areas (Question: what is the condition of electronically stored information in the areas of the Toronto-Centred Region?)

Results

It is important that specific results be strenuously striven for in both (a) and (b).

The kinds of results in the substance to be looked for in the teleconferencing are:

1. Specific decisions on policy or administrative procedure etc. arrived at after discussion. This is likely to be the highest use.
2. Discussion driving at bringing out the issues on which decisions must be taken.
3. Discussion arriving at reaping synergetic efforts for a particular area – the question of ‘What would you do?’ posed by one principal to the others.
4. Exposition of a difficult situation by one principal to the others and requesting specific commentary.

The results to be looked for in the information part are:

1. Transfer of knowledge gained in one area to the others. (Note information means not only statistical and other ‘fact’ but the conclusions therefrom derived.)
2. Array of similar information from several nodes for purposes of comparison.
3. Processing of information.
4. What is done with information by receiving nodes after transfer from sending node.

Briefing of Participants

It will be difficult to bring the principals simultaneously to Toronto

for briefing. Most of them come to Toronto from time to time. They could be individually shown a mock-up of the equipment. Briefing will consist of:

1. On occasion of visit to Toronto each principal will arrange to see the principal researcher.
2. Written explanatory material.
3. Written instructions in network discipline.
4. Written instructions on self-monitoring.
5. Outline of 50% of topics for (a) (remainder to be blind, initiated by selected principals).
6. Instructions for selecting topics.
7. Instructions about selecting information material.
8. Instructions on reporting.
9. Instructions for visual material (maps, charts, film of a part of a city, etc.).

Briefing of Technical Monitors

Planners versed in the problems of the Toronto-Centred Region will be required – one to each node – to act as technical monitors, to the teleconferencing and the information handling. Their role is to observe and comment on how the participants proceed from a technical planning point of view. Elements of importance on which information will be required are:

1. Can the participants get over quickly and easily the material to the other nodes bearing in mind areas are widely dispersed?
2. Do they stick to the subject in hand?
3. Does the equipment inhibit their technical thinking?
4. Does the equipment make difficult any particular areas of discussion?
5. How well is pictorial material integrated with the discussion?
6. Do regional matters present differences from urban matters?

Briefing of Behavioural Monitors

One monitor will be required at each node. Special attention will need to be paid to:

1. The fact that principals are responsible for large areas of jurisdiction.
2. Regional planning works at a considerable degree of abstraction.
3. Broad cultural aspects are important.
4. There are considerable differences between the parts of the TCR, consequently the actors may be somewhat 'distanced' from each other in terms of conferencing.
5. The items listed under this heading in Exercise 1, (a) to (e).

Monitors will receive instructions on reporting. Some overlap of monitors between this exercise and No. 1 is desirable.

Duration of Exercise

Two days on the network for (a) teleconferencing. One day for (b) information handling.

Study Group

On completion of the operations on the network the participants will be asked to return a completed questionnaire to the principal

researcher who will set up a study group to report results with particular reference to:

1. The estimated degree to which the teleconferencing can (a) substitute for, and (b) supplement face-to-face meetings.
2. An estimation of the risks that would be incurred if decentralization of the Toronto-Centred Region planning process from Toronto were to be carried out relying on a teleconferencing ability.
3. The benefits apparent to the area planning officers.
4. The usefulness of information interchange at greater metropolitan region level.
5. Indication of the kinds of information most likely to be usefully interchanged.

Exercise Manager

This function will be performed by the principal researcher. He will also collate the reports and relate to other exercises.

4.4. Exercise No. 3: Multiple Participation in the Regional Planning Process

Preamble

A major problem in planning is to find ways of achieving effective participation in the planning of regions. Because of constraints of distance and time it is difficult to bring groups together to work effectively. The use of a common electronic space would appear to offer a solution as local groups could remain in their own areas and yet simultaneously be in immediate contact with other groups.

Purpose

To test the likely effectiveness of the use of a common electronic space for improving the participation of dispersed groups in contributing to the regional planning process, and to obtain experience of linking participation on the experimental network with group inputs not directly connected to the network.

Participants

Groups will be set up with specific foci of attention. These groups will include subgroups.

Group 1. Group for guidance and synthesis. In collaboration with the other groups this group will be responsible for developing the research process and crystallizing the proposals into the form of proposed policies and developmental patterns. This group could be mostly planners.

Group 2. Group for searching for possible futures, i.e. key characteristics of the culture, effects of technology etc., scenarios. This group could be composed of a wide range of socially concerned disciplines.

Group 3. Group for reduction of cultural and technological factors to concrete terms in social and physical aspects. This group could consist of planners and social scientists.

Group 4. Group for examining present status of the area, including its current planning and effects of plans in operation. Planners and urban studies scholars and practitioners.

Group 5. Group for defining new institutions and foci of power in the emerging society. This group could be composed mostly of social and behavioural scientists but also some planners.

The groups could be seminars already existing or specially formed in Carleton and Ottawa Universities. The planners might be provided by the Planning School in the University of Ottawa. Professionals from the Ottawa area should be added to these groups. Their contribution would be very important. Groups should not exceed fifteen individuals. See Fig. 9.

Substance

Discussion on existing planning proposals for the Ottawa Region, 'futurist' material from the literature, and public participation material would be used to arrive at key conclusions about the region in the year 2000. The substance consists therefore of selected components of the planning process.

Method of Proceeding

The five seminar groups (which would be on-going classes in the universities) would begin by each discussing its topic internally and setting up sub-groups for specific items. As a certain point all would come into the common electronic space through the five nodes of the network for interaction.

From then onwards the interfaces would be of the types scheduled on the Time Interdependencies and Independencies table as may be required by the development of the program.

The method allows:

1. Individual independent work, or very small group work.
2. Larger group discussion.
3. Delayed or immediate interface with other groups.
4. Simultaneous posing of questions to several groups.
5. Time for digestion and assessment of inputs.
6. Monitoring of the process and critique of the product.

Time Interdependencies and Independencies

1. Subgroups	Individuals interface at their own convenience.
2. Seminar Groups	Meet at independent times for discussion of material from subgroups. No interface necessarily with node.
3. Ditto	Interface with own node. Material to be stored.
4. Ditto	Interface with own node and tap material stored in or by other nodes.
5. Nodes	Interface with each other.
6. Nodes	Nodes store and transfer material to other nodes at own initiative.
7. Nodes	Nodes ask questions of each other or other sources.

- | | |
|---|--|
| 8. Two or more Seminar Groups and their Nodes | Interface mutually in real time. |
| 9. Seminar Groups and Nodes | All interface simultaneously in real time. |

Briefing of Participants

The groups will be briefed chiefly through written material as to the purpose of the exercise and the procedures to be used. Written material and lecture/seminars will be provided to offer information about the existing planning proposals for the area. A bibliography will be necessary for indicating material useful for approaching futures. The leaders of the groups will be given instruction on the terminals in Carleton University. The various groups will be given a free hand to develop their parts of the exercise.

Briefing of Technical Monitors

One technical monitor will be required for each group. He will be required to attend all sessions whether on the node or not. The following will require particular attention:

1. The ways in which the group decides to use its node.
2. The effects of mixing stored material with real time interfacing.
3. The efficiency with which the group reaches significant conclusions.
4. The comparative usefulness of the group discussions and the network discussions in reaching these conclusions.
5. The time element (time needed) placed against the quality of the results.
6. The sense of genuine participation generated through the system.

Briefing of Behavioural Monitors

One monitor will be required for each group. Attention is needed to:

1. The differences in behaviour between the subgroups and the group.
2. The difference in behaviour when the group is interfacing live with the network and when it is not.
3. Tendencies of individuals to dominate discussion.
4. The tenuousness of the complete system. Do the subgroups feel in it?
5. What synergistic effects are visible?
6. What are the relationships of the group leader to (a) his group, (b) the network?

Reporting

Reports will be required from the group leaders, one person in each subgroup, one individual from each group, the technical monitors and the behavioural monitors. Indication of the form of reports will be provided. The substance will be reported upon jointly by the group leaders organizing a report of the findings.

Study Group

On completion of the network runs and the reporting a study group will be set up to provide a final critique of the exercise. Its terms of reference are open.

Duration of the Exercise

Approximately one academic term, with intermittent use of the network on a regular basis.

Exercise Manager

This role might be played by a staff member of one of the participating universities. He should be available throughout the duration of the exercise, but need not necessarily be full-time. He could be usefully assisted by a small advisory group drawn from the participants. He would be responsible for the administration of the whole exercise and the delivery of the output to the principal researcher.

4.5. Exercise No. 4: Interdepartmental Teleconferencing in Provincial Government

Preamble

Coordination of efforts by the various departments of provincial government is a particularly important part of the planning process for the Toronto-Centred region. This is because of the probability that in the implementation of the proposals, the programs of the various departments will play a major role in guiding the contribution of the private sector. It will therefore be vital to improve the flows of interdepartmental information and to facilitate discussion between departments at all stages of planning and implementation.

Purpose

To explore teleconferencing for improving the quality and speed of provincial government decision-making where decisions have significance for the planning of the Toronto-Centred Region and are interdepartmental in nature.

Role of Information

Apart from the role of serving as the context in which decisions are taken there is the additional function of alerting or warning. Some needed collaboration does not take place simply because departments are not informed in the initial stages of a project. Information should be organized to act as an early warning system so that any department having an interest may express its concern at an early stage. This exercise will be divided into two parts: (a) early warning function, and (b) teleconferencing for exchange of opinion and decision-making.

Early Warning Function

Operationally periodic passing of information on a systematic basis will be necessary. For example, it might be arranged that each department tapes at the end of each day brief details of each new piece of business that has arisen. During the night this material could be computerized, transmitted to all other departments, and printed out ready for staff on arrival the next morning. Each department could have a staff member scan this material and distribute appropriately. A department showing interest would register its concern in the recording of that evening, the material being available to all departments (including the originating department) the following morning. On the basis of this early warning system meetings or teleconferences could be scheduled.

Teleconferencing Function

The functions of teleconferencing for departments are:

1. To ensure that the relevant inputs by other departments are made early in the process of making the planning decision.
2. To allow reconciliation of differing points of view by the various departments.
3. To achieve agreement as to the decision so that all departments will honour it.

Participants

The nodes will be best manned each by two senior officials for the following departments:

1. Regional Development Branch.
2. Municipal Services Division.
3. Dept. of Environment.
4. Dept. of Transportation and Communications.
5. Dept. of Natural Resources.

Substance: Early Warning

Before running the exercise the participating departments will each prepare material from the two or three days immediately before the exercise. This will be delivered to the nodes in written form ready for transfer on to the terminals. The stages of the exercise will be:

1. Each node transfers its material to the terminals.
2. The terminals transfer the material reciprocally, including print out.
3. The participants scan the material and each node selects material that interests it and prepares to record its interest to the other nodes.
4. Statements of interest are transferred reciprocally.
5. Discussion takes place to set up a teleconference on a subject of common interest.

Substance: Teleconferencing

This should be allowed, if possible, to arise out of the information part of the exercise. This, however, is not likely to be very practical. The procedure should be to hold the following options open:

1. Material arising from the information part of the exercise.
2. Several items known to the chief planner of the Toronto-Centred Region requiring interdepartmental discussion at the time the exercise takes place.

Results

In the teleconferencing specific results may be striven for. They may include:

1. Clarification of items on which the various departments individually must do further work or provide a decision.
2. Group decisions.
3. Discovery of areas where policy is lacking.

In the information part specific substantive results will be more difficult to achieve. Attention should be paid to the general effectiveness of the method in disseminating information.

Briefing of Participants

Principals and senior staff can be briefed in the offices of the Ontario

government or in the Dept. of Urban and Regional Planning, University of Toronto, by the principal researcher: See Exercise 1, (a) to (h).

Briefing of Technical Monitors

Two technical monitors will be sufficient. One should be a planner and the other a social scientist. The role is to report on the technical effectiveness of the method for the purposes laid down. See Exercise 1 under the same heading, (a) to (e).

Briefing to Behavioural Monitors

One monitor will be required on each node. Their attention should focus on the items listed in Exercise 1, (a) to (e), with special attention to the question of capacity to handle information and overload.

Duration of Exercise

One day for the information early warning component and two days for the teleconferencing.

Study Group

On completion of the operations on the network the participants will be asked to return a completed questionnaire to the principal researcher who will set up a study group to report results with particular reference to:

1. The likely effectiveness of the early warning system.
2. The degree to which departments will be likely to act on the information provided by the early warning information system.
3. The effectiveness of the teleconferencing in bringing out unperceived problems.
4. The effectiveness of the teleconferencing for reconciliation.

Exercise Manager

This function will be performed by the principal researcher. The monitors will report to him, and he will collate the material from the various parts of the exercise.

CHAPTER FIVE

EXPERIMENTS AND SIMULATIONS ON THE WIRED CITY FACILITY (Continued)

5.1. Exercise No. 5: The Uses of Networks for General Participation in the Urban and Regional Planning Process

Preamble

Public participation in discussions and decisions on urban planning matters has become an important part of the process during the last few years. The desire for greater participation presents difficulties which telecommunications/computer technology may help to overcome while at the same time offering new possibilities for participation:

1. The physical area over which participation can take place at present is restricted substantially to the local area in which a face-to-face meeting is possible.
2. Such meetings generally lack information and instantaneous access to information.
3. Experts can be brought to face-to-face meetings but costs are high and scheduling is difficult.
4. Participation at metro-wide or regional level is extremely difficult to devise.

Networks would offer benefits in participation, among which are:

1. Local groups in widely separated locations could come together in teleconference.
2. The network could be linked to information sources.
3. Experts could be brought on to the network ad hoc as the discussion proceeds.
4. Material in offices could be displayed and visual material could be made accessible to local groups.
5. CATV could be used.
6. Teleconferences will develop a new discipline.

Purpose

To test the following uses:

1. Teleconferencing between several local participation groups and the planning departments on specific issues.
2. As above with the additional capacity to draw instantaneously on sources of information.
3. The network circuited with CATV so that the participating groups may have their discussion disseminated over a considerable area and receive back by telephone questions from the CATV viewers.

Participants

Members of four participation groups in Ottawa. Each group will provide two major and four minor participants. Four nodes will therefore be manned each by six participants. The fifth node will be manned by three planners from various appropriate offices in the Ottawa area.

The two principal participants will be the spokesmen (one will be chairman). As discussion proceeds they will refer questions to the other four, digest the results of the discussion and put it on the network. The relationships are therefore:

Principal, chairman	}	on camera
Principal		
Four Minor Participants	}	on node but only intermittently on camera
Others in Local Group		contact at local meetings
CATV Network	}	public having access

At preliminary face-to-face meetings the local groups will carry out work preparatory to the network sessions.

Substance

This should be live material on hand in the groups at the time the exercise is run. Examples of issues are: downtown redevelopment, a proposed arterial road, a new peripheral development, the siting of some major facility. Some regional issues must be included, if necessary, groups specially diverting attention to such questions.

Method of Proceeding

- Stage 1.* Identification of four local Ottawa groups with specific problems of some common interest.
- Stage 2.* Preparation work on the problems.
- Stage 3.* First teleconferencing session between the planning staff and the local groups.
- Stage 4.* Review of effects of stage 3.
- Stage 5.* Second teleconferencing session.
- Stage 6.* First teleconference with capacity to call instantaneously on information.
- Stage 7.* Review of stage 6.
- Stage 8.* Second teleconference with capacity to call instantaneously on information.
- Stage 9.* First teleconference with CATV capacity.
- Stage 10.* Review of stage 9.
- Stage 11.* Second teleconference with CATV.
- Stage 12.* Study group session.

Briefing of Participants

The exercise will start with briefing to the members of the local groups in face-to-face meetings. The purposes and organization of the exercise will be explained. At those meetings the principal participants will be selected. The principal participants will then be briefed for teleconferencing and will visit a terminal. The planners will be briefed at a terminal.

Briefing of Technical Monitors

Two will be required. They should circulate round the nodes. Particularly important will be report on the extent to which the substance

is responsibly handled on the network, and the attempt to judge the extent to which discussion otherwise impossible is achieved. Special attention should be paid to examining whether the substance is got across adequately and quickly. How quickly are decisions reached and what is their quality?

Briefing of Behavioural Monitors

One will be required on each node. Monitors will be required to attend all off-network meetings of the groups. Important questions are:

1. Is the behaviour of the participants conducive to good quality decision-making?
2. What is the quality of discipline?
3. Are participants different in their behaviour from what they are in face-to-face meetings?
4. Do the physical arrangements of the nodes have any special effect?

Study Group

On completion of the running on the network a study group consisting of two members of each node group will receive reports from all groups and monitors. The exercise manager will chair this group and be responsible for producing the final report.

Duration of Exercise

Each stage on the network will normally take place in the evening and will last four hours. The successive stages must have adequate time between them for reviews to be carried out. The study group will sit for three sessions each of four hours.

Project Manager

He must be a person experienced in public participation work in the planning field. He must be discretely able to exert influence when necessary. He will be responsible for organizing and running the whole exercise and seeing that the reporting is properly carried out.

5.2. Exercise No. 6: Physical Detailed Design of a Micro Urban Area

Preamble

The present method of dealing with major complexes of urban development is that planning regulations serve as the framework within which the private developer proceeds to prepare detailed drawings. If he can keep within these regulations the planning authority may never see the plans and may know nothing of the scheme until digging begins. Only if an amendment to the planning bylaw is necessary may the planners get an opportunity to discuss the matter with the developer before too much detailed design is committed. An improved procedure would be for the developer of any major complex to be required to have a preliminary discussion with the planners and other agencies of government, then to submit an outline proposal of his intentions *in principle only*. At that point all governmental agencies involved ought to have their say, preferably simultaneously so as to hear each other commenting, rather than seriatim and only in writing.

Purpose

To test the usefulness of the network for enabling government

departments to contribute their inputs to the shaping of a major urban development (apartment complex, for example) with particular regard to:

1. Making the inputs at a moment when the design is still fluid.
2. Getting departments into simultaneous discussion including with the developer.
3. Speeding up the process.
4. Improving the quality of design.

Participants

Six Agencies are to be represented:

1. The urban planning department.
2. The regional planning agency.
3. The urban department of roads.
4. An agency concerned with aesthetics.
5. An agency with environmental-psychology interest.
6. The developer (located on the urban planner's node).

The planners could be from the City of Ottawa and the Ottawa-Carleton Planning Area office. The transportation component could be from the City of Ottawa. The developer is simulated; should be an individual from the development industry (possibly a member of the Urban Development Institute operating in the Ottawa area). The aesthetic interest might be an agency of government, e.g. a city architect or a consultant in the field. The environmental-psychology agency is unlikely to be found in government and will have to be satisfied from another type of source. The interest here is concern for the stability and development of the human personality in relation particularly to the effects of the physical environment (in all its aspects).

Substance

This exercise may use an actual application for development, if one is readily available, or alternatively the site could be real and the development simulated. The scheme should be multi-use and relatively high density so that questions of transportation, piped services and human responses become important;

1. At least 2 levels of government to be concerned about its detailed planning.
2. It shall have present controls upon it by both the city plan and the implementing bylaws.
3. The controls should be such that the developer would apply for amendment.

Method of Proceeding

Stage 1. A developer will propose to develop it with a fair diversity of development. He will prepare an outline development proposal in principle. This proposal will comprise plans, sections etc., verbal description, photographs of site, and an outline budgetary statement. The items under which he requires amendment to the planning controls will be itemized.

Stage 2. The representatives are to make themselves familiar with the scheme and prepare their questions and objections in detail.

- Stage 3.* The network will be used for live discussion of the proposals and generating improvements.
- Stage 4.* Agreed changes will be printed out and delivered to the developer.
- Stage 5.* The developer will bring his objections back for further discussion on the network.

Briefing of Participants

The exercise manager will develop detailed instructions for the developer's initial contribution. Instruction for network discussion will be given on a terminal. Detailed reports of results will be required from all participants. Departments of government not operating on the network should be invited to provide brief written statements of any difficulties they may have with the proposal so that these may be discussed on the network.

Briefing of Technical Monitor

One technical monitor will act as critic of the entire process including the generation of the preliminary material. He should pay particular attention to:

- 1. The quality of discussion on the network.
- 2. Estimating the decree of success the process has in improving the quality of design.
- 3. What the synergetic implications may be of the process as a design technique.

Briefing of Behavioural Monitors

One monitor will be required on each node. Special attention needs to be paid to:

- 1. Whether the network stimulates or inhibits creative ability.
- 2. Whether the system delivers genuine results in judgemental terms or whether they turn out to be invalid on further reflection.
- 3. The degree to which confidence is generated.

Study Group

On completion the group which operated on the network will continue as a study group to report results with particular reference to:

- 1. The general effectiveness of the method in arriving at better design proposals.
- 2. The savings in time.
- 3. Behavioural changes or difficulties caused by operating on the network (poor decisions, loss of creativity etc.).
- 4. How the process could be effectively institutionalized in existing governments.

Duration of Exercise

The first part (off the network) need not have a time limitation. The time on the network will be two days. The study group will require one day.

Exercise Manager

He should be an urban planner. He will be responsible for running the exercise, including the generation of all instructions and collating of the material for the final report.

5.3. Exercise No. 7: Transfer of Information

Preamble

In spite of attempts at databanks, geocoding etc. by planning agencies very little is known about how electronic equipment can be used to solve the acute problems facing planners in the field of information. Basic to enquiry is the relatively obvious need simply to transmit and receive information. This is not as easy as it sounds because:

1. The material is not standardized in size, methods of indexing, methods of subdividing, cataloguing.
2. The material is voluminous and unwieldy in the quantitative sense.
3. Searching methods are very inadequate.
4. In spite of modern methods of information exchange most offices operate in a self-contained way.
5. In spite of the activities of research agencies and sections of offices devoted to 'research' nobody really ever knows what research is going on.

Purpose

Assuming that in the future planning offices will have efficient electronic links the overall purpose of this exercise is to explore the basics of information transfer; to test the ability of the network to handle various kinds of planning information:

- (a) Written material
- (b) Diagram material (including colours)
- (c) Spoken material of single individual
- (d) Spoken material of group
- (e) Precis of material

so that the planning process is facilitated particularly bearing in mind that it is rapidly becoming systemic in method (Fig. 8).

Participants

Probably the most useful way of manning the nodes would be to select planning offices from an area in which they are already interacting. For example, within the context of the planning of the Toronto-Centred Region:

1. Controlling and disseminating node, the Toronto-Centred Region Planning Office
2. Richmond Hill Planning Office
3. Vaughan Township Planning Office
4. Markham Township Planning Office
5. Regional Municipality of York Planning Office

A problem is that some of these offices have very small staffs. It might therefore be necessary to use supplementary staff specially taken on and financed for this exercise. This could be done by using graduate planning students on a research basis.

An alternative may be to use the offices of major towns in the Toronto-Centred Region, e.g. Barrie, Oshawa, Oakville. The quality of information available is important. A preliminary study of alternative participants could well be necessary just before the exercise takes place.

Substance

Material should relate to real substance, i.e. actual data, questions to be investigated, decisions, trends, material etc. The substance of the exercise is, of course, method. It should include transfer of material:

1. From central node to all other nodes
2. From other nodes back to centre
3. Between other nodes

These linkages should be accomplished:

1. In simultaneous transmission and reception
2. In arrested time with storage
3. By drawing on the material when stored

The allocation of time will be required to include systematic opportunities for the receivers to ask questions of the transmitters.

The exercise should be scheduled in these broad divisions:

1. Written material: complete texts, various compactations (see under 'Compaction')
2. Pictorial material
3. Spoken material
4. Combined written and spoken material
5. Combined written and pictorial material
6. Combined written, spoken and pictorial material

Compaction of Material

The voluminousness of the material presents a very serious difficulty to the effective use of a network for this purpose. This is partly a human and partly a machine question. This exercise will be required to explore the possibilities of compaction, *inter alia*:

1. Extraction of key ideas
2. Extraction of key words
3. Subtitles or headings
4. Precis
5. Critiques
6. Use of recommendations
7. Questions and answers

Method of Procedure

Stage 1. Preliminary compactations of various kinds of material will be made in preparation for putting on the network. For example, a staff member will be asked to read several documents and extract their key ideas. The exercise must then (a) find out how to record them, (b) how to store for retrieval.

Stage 2. Material in various forms is to be transmitted ready for use.

Stage 3. The experiences are to be collated and to be reported as recommendations for the basics of an information system for planning offices.

Briefing of Participants

The exercise manager will allocate the types of compaction to be examined by the various offices. The participants will be instructed on scheduling for this part of the exercise. Technical briefing about operating the network will be given either in Carleton University or the Univer-

sity of Toronto. Scheduling of the details of the transmissions will need careful working out and briefing of the participants. This will be done by the manager. Self-monitoring by the participants will be important.

Briefing of Technical Monitors

Two technical monitors will be required. They should circulate round nodes. Their role is to observe from two technical points of view: (a) electronic engineering and data handling, (b) planning information. Of importance are:

1. Where does the equipment inhibit a desired function?
2. How valuable is the technique likely to be to planners?
3. Will the technique bring more availability of fact effectively into the planning process?
4. How acceptable can it be made?

Monitors should be specialists in (a) and (b).

Briefing of Behavioural Monitors

One will be required on each node. Of particular importance are:

1. How do recipients react to compactions coming from other nodes? Will they accept their inherent judgemental elements?
2. What is the behaviour of the information handlers? Are they likely to become key people?
3. What opportunities for creativity do the information handlers discover?
4. Does key material become obvious as material is interchanged?

Study Group

On completion a study group will be formed to report and offer findings particularly on:

1. The ways in which planning offices can be converted to the use of these techniques.
2. The problems connected with compaction and how to overcome them.
3. Questions of compatibility between offices.

The exercise manager will be responsible for the study group.

Duration of Exercise

The compaction preparations might be given three weeks in the offices under the guidance of staff devoted (as part of the exercise) full-time to this part of the work. Two days would initially be required on the network. This would be followed by one day of face-to-face discussion on results, determination of modifications, and one further day on the network. The study group would require two full days for meeting.

Exercise Manager

He should be an information man with experience of planning offices or a planner with experience in information handling. Above all he needs to be convinced of the importance for planners of vastly improving their information base not only as individual offices but as *regional systems of offices*. He will be responsible for the administration of the entire exercise and providing the findings in report form to the principal researcher.

5.4. Exercise No. 8: Synergetic Use of Brain Power in the Urban and Regional Planning Schools across Canada

Preamble

Except for the Toronto and Montreal areas the university planning schools are widely spaced across the country: Montreal, McGill; Queen's; Ottawa; Toronto, York; Waterloo; Manitoba; British Columbia. They generally have small groups of staff (often less than 10) and although they have interdisciplinary relationships within their own campuses they suffer from infrequent contact. Systematic interchange of ideas both in teaching and research could raise the educational level of the schools' programs and at the same time could greatly enhance the contribution of the schools to work on the urgent planning and developmental problems which face Canada (quality of urban environment, the use of resources, the conservation of energy, the development of a new style economy, the development of new value systems suitable for the conditions into which we are being pushed, etc.). Teleconferencing between some of the schools could produce synergetic results.

Purpose

To test the ability of the network:

1. To improve the level of education in urban and regional matters in selected planning schools across Canada.
2. To produce synergetically generated results in raising our level of knowledge about cities and regions and how to act upon them.

Participants

Schools should be chosen from representative areas of Canada. The following are suggested, of which UBC and Toronto have already expressed interest:

McGill	Metropolitan Area
Toronto	Greater Metropolitan Area
Ottawa	National Capital Metro
Waterloo	Multi-cored City-Region
UBC	City-Region

Both parts of the exercise will be manned by two participants from each school:

	<i>Teaching</i>	<i>Exploration</i>
Principal Participant	A	B
Second Participant	B	A

The selection of participants requires special care; there are no obvious claimants as in the case of many of the exercises. The participants need not necessarily be the same individuals as those who generate the substance. The following criteria are important in selecting:

Teaching Part of Exercise

1. Capacity to guide a seminar so that it arrives at something; the ability to generate structure as discussion proceeds. Structure should not be preconceived or rigidly imposed.

2. Interest in comparative processes so that the 'turf' of each school can be exploited to the benefit of the rest.
3. Should have ideas himself and be articulate but should not be skewed to the extent that the seminar becomes his creature. Fashionable emphases are undesirable.

Exploratory Part of Exercise

1. Capacity to make imaginative connections between ideas from different fields.
2. Should have some positive views as to the context of thinking within which planning exploration should take place but at the same time be openminded.
3. Must be willing to do considerable thinking work before the exercise takes place.

The selection should not be left wholly to the schools themselves. It is suggested that the schools should be asked to submit names and details of staff members interested. The names could then be reviewed by the three 'best qualified' individuals named under method of procedure below and the selection made according to the criteria listed above.

Substance

Two kinds of material are distinguishable:

1. Known material typically appearing in the teaching / learning process. This may deliver new ideas but usually does not. The function here is to raise the general level of instruction.
2. Exploratory material. The aim here is to break new ground particularly in the area of Canadian urban and regional matters.

Under the first heading it would be particularly useful to have teleconferencing in courses which deal with the local substance of a school's region, e.g. U/T Metro Toronto Planning Seminar 1032X.

Interchange on the basis of similarities and differences between the Vancouver, Toronto and Montreal metros would be very instructive and is at present extremely difficult.

Under the second heading it would be most valuable to identify the key contextual questions that are going to dominate our urban situation to the end of the century. These might be suggested as:

1. Serious depletion of fossil fuels.
2. Serious depletion of resources of certain metals.
3. Rapid change in the social fabric under the diminishing ability of the economic system to distribute the wealth generated.
4. Exploding world human populations.
5. How the application of telecommunications and computer technology may help in dealing with these problems.
6. Development of new patterns (other than metros) of population distribution.
7. How values are to be shifted.

Method of Procedure

This presents no particular difficulties. Appropriate seminar substances can be decided by the schools. Participation on the WCF will require:

1. Recording on video / audio tapes of seminars in each school.
2. Interchange by post of these tapes.
3. Repetition of the above procedures to build up interchange on tapes to be run on WCF.
4. Each node to be manned by two participants from each school to act as panel representatives of different views from each school.
5. One node to act as moderator for each seminar.

Synergetic Explorations: The question of how to decide the substantive questions to be tackled is difficult. If decided on a 'democratic' basis the selection can only be mediocre. If done 'dictatorially' it may be brilliant but leave something out, not to mention producing an antipathy in the participants. The following mix may be a way. First ask all participating schools to submit through a spokesman as many key areas as they think they can identify. Next select three 'best qualified' individuals to look over these offerings, choose in their opinion the most important, and rank in priority order. All this should be done through the mail before going on WCF.

Synergetic Output

Given the above context the exploratory part of the exercise should strive to *deduce* ways in which the application of telecommunications / computer technology may serve to develop policies capable of dealing with the implications inherent in the contextual statement. Hence, it might be deduced, for example, that the dispersal of metropolitan populations will be necessary. If so, then a question is: How can the technology help maintain or enhance the level of transaction efficiency of our present metros?

Briefing of Participants

Because of the distances of the schools apart briefing will have to be dependent on written instructions plus a visit to the terminals immediately before running the exercise. The exercise manager will produce tapes of verbal instructions. Seminars will be taped in the home bases of the participants using normal classes.

Briefing of Technical Monitors

Two will be required. The role is to report on:

1. The effectiveness of the teleconferencing seminars for improving the teaching / learning process.
2. The effectiveness of the method for synergetic exploration particularly in regard to key ideas related to social change.
3. The degree to which new ways of using the equipment for these two functions may be developed.

Briefing of Behavioural Monitors

One monitor will be required on each node. Special attention should be paid to the synergetic part of the exercise in terms of:

1. What triggers synergetic thinking?
2. What are the influences of the environment of the node?
3. What role does the temperament of the participant play?

Study Group

Immediately after completion while still in Ottawa the participants

and the monitors will form a study group to bring the findings together. These will be formed up into a report by the exercise manager and delivered to the principal researcher.

Duration of Exercise

An unspecified preliminary period in seminars in the home universities. Two days will be required for the teaching portion, followed by two days for the synergetic portion. One day for the study group.

Exercise Manager

He should be a planner academic with ability in handling thinktanks if possible. He will be responsible for the entire exercise.

Trans-Canada Network

It is possible that an experimental network linking several universities across Canada (CANUNET) may be achieved fairly soon. It is also possible that certain universities in southern Ontario may be linked for data-handling purposes (METANET). These networks are proposed by the Ministry of Communications and the Council of Ontario Universities respectively.

The exercise proposed here could serve as a useful pilot to operating a full-scale network experimentally. This exercise would also appear capable of being run on a full-scale network.

5.5. Exercise No. 9: Synergetic Exploration for New Institutions and Functions

Preamble

The rationale is that new institutions, or regrouping of parts of existing ones, will emerge as a result of technological change. The sequence of reasoning is as follows: In addition to rapid development in the telecommunications / computer field many other changes are taking place in society, for example an increased interest in leisure, a decline of interest in work as a justification of life, a renewed interest in direct democracy, new emphases in education, increases in income levels, new successes in medicine, new methods in business and manufacturing. Some of these self-evidently interact with the telecommunications / computer technology resulting in modifications already in progress. It is common to take the existing fields and study their changes under the impact of the technology. Thus the 1972 Seminar on Applications of Computer / Telecommunications Systems run in Paris by the Organization for Economic Co-operation and Development listed the following headings for study:

1. Finance, banking, insurance
2. Public administration
3. Health services
4. Education
5. Service bureaux
6. Information and documentation services
7. Transportation
8. Industrial applications (including retailing and distribution)
9. Energy distribution and public utilities

These headings, however, generally represent institutions which have grown up around an existing level of technology on a historical cultural base. They are therefore typically identified by elements which have come to be regarded as largely inevitable. The hypothetical insight which underlies this exercise is that new institutions will emerge under the impact of the technology grouped with clusters of other items of change (whether technical, economic, social, or cultural). Further, the hypothesis is that by synergetic intellectual effort some shaping of these new institutions may be achieved.

Purpose

To test the usefulness of teleconferencing combined with careful preliminary work to allow the accomplishment of high level synergetic thinking, and to obtain specific outputs in regard to the definition of new institutions.

Participants

Two participants will be selected for each node. The criteria for selection should include:

1. Ability to be stimulated creatively by the ideas of others. This implies a capacity for listening to what others say and putting it within the individual's own body of ideas in a productive way.
2. An interest in the field of social institutions, the way they develop, decay etc.
3. Familiarity with the literature of futures and a natural preference for thinking in this mode.

The two participants on each node will be from the same geographic area so that they can discuss substance easily, independent of the network.

Substance

The areas of substance will need detailed preliminary study in order to ensure that network time is not used for inefficient discussion. The following will illustrate a possible area substance:

Information as a New Institution

What will be its functions?

How will it be linked to other new institutions?

What roles will individuals and groups play in it?

How may its development be fostered?

What indications are there that it is already present?

Other areas of substance may be adopted from previous chapters, e.g. the Brain Net, Knowledge-Nurture, Operations, the Psychosystem, Eco-Soc-Econ Decision-Making.

The exercise is to try and 'see' each new institution and its place in the society as a whole

Method of Procedure

Stage 1. The principal researcher will instruct the major participants in terms of the substance which each pair of node participants will be asked to work on.

Stage 2. The participants of each node will discuss between themselves the new institution assigned, attempting to be as specific as they can at this stage. After discussion the skeleton

of the material is to be sent to the principal researcher along with questions and a statement of where the new institution is thought to intersect with other existing or new institutions.

Stage 3. The principal researcher will collate the material and circulate to all participants.

Stage 4. The discussion is run on the network, with the following targets:

1. To get interchange of views on the nature of the new institutions.
2. To deduce results from known or hypothesized facts.
3. To avoid the danger of changing one element and forgetting simultaneous change in other elements.
4. To obtain the benefits of synergetic effort.

Stage 5. Study group will analyse, collate and report.

Briefing of participants

As the participants will most likely be drawn from various areas of Canada briefing will be by correspondence reinforced by a visit to the terminals immediately before running on the network. Briefing will include guidance from the principal researcher on substance for each node participants and written material bringing the exercise to a threshold level before going on the network.

Briefing of Technical Monitors

Two monitors will be required. Their task will be to watch and report on the development of the substance as the exercise proceeds, particularly with emphasis on synergetic efforts. They are likely to be best drawn from the social sciences.

Briefing of Behavioural Monitors

One will be required on each node. They should pay particular attention to the ways in which synergy is generated and sustained. How does the physical environment affect the thinking? Is the equipment inhibiting of this kind of thinking process?

Study Group

Immediately on completion of the work on the WCF one participant from each node will constitute a study group together with the monitors to report on the exercise.

Duration of Exercise

The preliminary work requires no stipulated time but enough should be given for participants to involve seminars if they wish. Three days will be required on the network and two for the study group.

Exercise Manager

This role will be played by the principal researcher, who will be responsible for the initiating of the preliminary work and the mode of selecting the participants.

5.6. Exercise No. 10: Establishment of the Basic Environmental Design Criteria for the Greater Metropolitan Region of Southern Ontario

Preamble

If we take as hypothesis the major foci of concern suggested in this study – the ecosystem, the psychosystem and the socio-ecosystem –

it will be necessary to search for the key implications for the future patterns of human settlement in the region. The present pattern almost certainly will not fit the likely basic requirements and the future increase in population will have to be settled in patterns other than those at present typical. A very important idea is that the telecommunications/computer technology is capable of making new greater regional patterns workable without loss of the present benefits of the close settlement of large masses of population (metros).

Purpose

The purpose is rather to probe than to be exhaustive. Some work should be done in each of the three areas of hypothesis mentioned in the preamble. Key areas in each of these should be identified, discussed and related to the telecommunications technology, for example:

1. Can some definition be given to the question of how much change will be necessary to protect the ecosystem?
2. Can we reach any conclusions about the adverse effects of present urban life in large metros?
3. Can we say something about the implications of the emerging socio-ecosystem?

Participants

Two participants will be required on each node, backed up by at least twice that number off the nodes. The criteria for selection are:

1. Knowledge of the appropriate literature.
2. Conviction that a new situation is already upon us, requiring basic new approaches.
3. Concern for growing a new ethic in regard to man's place in the biosphere.
4. Knowledge of the planning of actual regions.
5. Knowledge of the planning of the Greater Metropolitan Region of Southern Ontario.
6. Ability to synergize.
7. Ability in deductive thinking.

Substance

The basic substance is twofold: the material of the thinking and the facts of the region of Southern Ontario. The essential task is to bring these together creatively and imaginatively, not in the context of present constraints. Rigorous selection will be necessary to avoid diffuseness. See purpose above. Suggestions from the thinking of the Club of Rome, the British ecologists (*A Blueprint for Survival*) and others include:

1. Enlarge focus of attention from Gross National Product to Gross National Welfare.
2. Consider how to reduce energy consumption without undue loss of ability to maintain standards.
3. Attention to an emphasis on durability of goods rather than rapid renewal.
4. Increase the use of renewable resources proportionately to non-renewable resources.
5. Eliminate 'unnecessary' physical movement.

6. Enlarge the market economy to a socio-economy.
7. Attention to all forms of pollution.
8. Telecommunications/computer technology.
9. Detach level of wellbeing from dependency on the idea of growth.
10. Decentralize populations.

Method of Procedure

- Stage 1.* The principal researcher will initiate the exercise by identifying areas of interest of the participants and asking them to write preparatory statements.
- Stage 2.* These statements will be circulated to all participants for comment. Originators will then modify their texts so that they point up specifics for discussion on the network.
- Stage 3.* Network discussions aiming to produce specific recommendations on which planners could base their planning.
- Stage 4.* Group discussion off the network and preparation of recommendations.

Briefing of Participants

By correspondence in regard to the purposes of the exercise and how to proceed in the early stages which are not on the network. Briefing on the nework procedures would be on one of the nodes as a preliminary run the evening before the sessions begin.

Briefing of Technical Monitor

One will be required to gather technical observations. He should be familiar with the ecological-resources literature and the literature of futures. He should have enough planning knowledge to be intelligent about the region.

Briefing of Behavioural Monitors

Two will be required. It is important to know something of the attitudes of the participants before the exercise starts on the conduct of the exercise. How far do temperaments influence the approaches of the participants?

Study Group

On completion of the running on the network all participants and monitors will form a study group to report.

Duration of Exercise

The time required for preparation should be ample. Three days will be required on the network. Two days should be allowed for the study group.

Exercise Manager

This function will be performed by the principal researcher, who will be responsible for initiating and guiding the preliminary work.

5.7. Conclusion

In general throughout the exercises careful watch should be kept for serendipitous findings.

The exercises have been organized to give some degree of cumulative payoff. They increase in interdependency as they advance.

In designing the exercises care has been taken to be practical and to design within the limits of the possibilities of materials and people likely to be available, while at the same time respecting the theoretical background developed in the earlier chapters. The design process has been carried out with the help of many individuals including some of the planning officials of Southern Ontario.

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GLOSSARY

- Abundance Region*. A region generating in goods and services considerably more than required for agreed basic levels of satisfaction.
- Ecofact, Psychofact, Sociofact*. The products respectively of the ecosystem, the psychosystem and the socio-ecosystem.
- Ecosystem*. A subsystem of the biosphere. It comprises flows of energy and matter and is characterized by interdependencies, interactions and symbiosis.
- Entropy-Negentropy*. This concept, borrowed from physics, is applied speculatively to human society, particularly in regard to the frictions of physical space in cultural terms. For this purpose entropy might be defined as the tendency to lose order into disorder. Negentropy is the holding of this tendency at bay. Civilization is thus negentropic. The openness or closedness of the system is important, as is the concept of 'noise' in information systems.
- Infosystem*. The total of all subsystems of information serving all agencies.
- Net*. A grouping of individuals or groups of individuals for a specific purpose in relation to a network.
- Network*. The technical equipment through which the members of a net are linked for information purposes.
- Noosphere*. The living membrane of human thought enveloping the planet.
- Psychosystem*. A specific portion of the noosphere. The nexus of psychic interrelationships linking individuals and groups with the region.
- Socio-Ecosystem*. The nexus of social and economic interrelations which sustains man's life in communities.
- Spatiosystem*. The related physical arrangements of objects in terrestrial space.
- Synergy*. Behaviour of a system, or group of elements, not predicted from the individual or subset behaviour of the components.

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